Man without learninge and remembrance of things past falls into a beastlye sottishnesse and his life is no better to be accounted of than to be buried alive.

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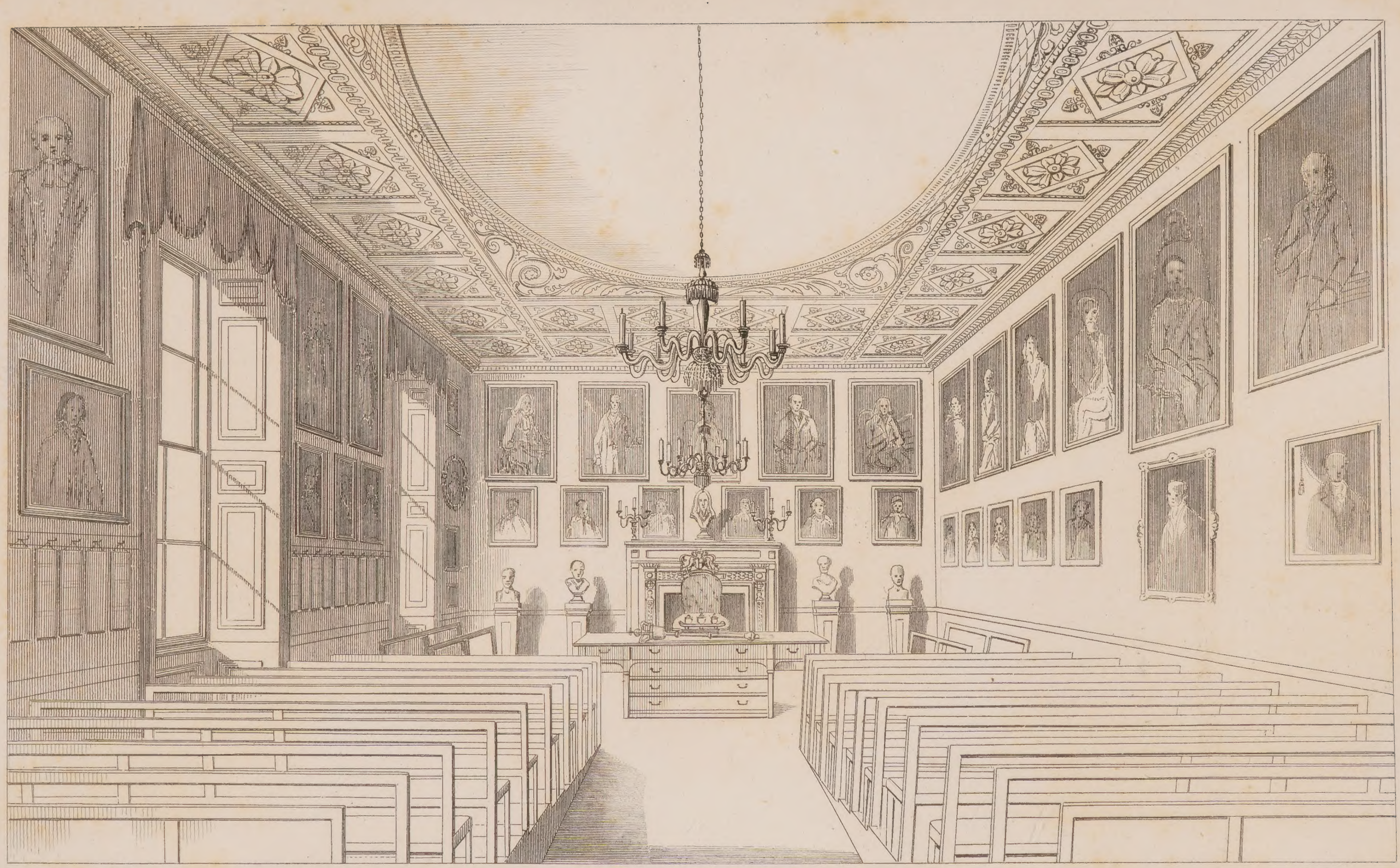
c

Charles John Butler Stewart
from his sincere friend
Edward H. Weale

On his leaving Eton
Election 1862.



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MEETING ROOM OF THE ROYAL SOCIETY, SOMERSET HOUSE.

A HISTORY OF THE ROYAL SOCIETY,

WITH

MEMOIRS OF THE PRESIDENTS.

COMPILED FROM AUTHENTIC
DOCUMENTS

BY

CHARLES RICHARD WELD, ESQ.,

BARRISTER-AT-LAW;
ASSISTANT-SECRETARY AND LIBRARIAN
TO THE ROYAL SOCIETY.

IN TWO VOLUMES.

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HISTORY

OF

THE ROYAL SOCIETY.

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1750—65.

GEORGE PARKER, was the only son of Thomas Parker, Lord Chief Justice of England, Lord Chancellor, and Earl Macclesfield[1], whose father carried on the business of an attorney at Leek, in Staffordshire.

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[1] A note in the 164th Number of the *Quarterly Review*, written by a gentleman in the confidence of the Macclesfield family, tells us, that, "The Chancellor had a grandfather descended from an old family of the name of Parker. George Parker, of Park Hall, Stafford-

His mother was daughter and co-heir of Charles Carrier, Esq. of Wirkworth, in the County of Derby. His education was entrusted to William Jones, Esq., V.P.R.S.; father of the distinguished Sir William Jones, chief judge in India; and we are informed that he studied mathematics under the celebrated De Moivre. In 1720, he set out on his travels over the Continent, accompanied by Edward Wright, Esq., a gentleman of refined and elegant taste. On his return, after an absence of three years, he married Mary, eldest daughter of Ralph Lane, Esq., an eminent Turkey merchant. In October 1722, he was elected a Fellow of the Society, and subsequently of the French Academy.

Lord Macclesfield's fame rests entirely upon his mathematical attainments, which were very considerable. As already shown, he was very instrumental in carrying through the bill for the reformation of the Calendar, which, says Lord Campbell, "made the Parkers for some time very unpopular, although it be now one of their greatest boasts[2]." It is related, that when the Chancellor's grandson was standing a contested election for the county of Oxford, the mob insultingly called out to him, "Give us back,

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Staffordshire, was the son of William Parker, seated at Ashburn, who was a younger son of Parker, of Norton Lees, in Derbyshire. The said George married Grace, daughter of Hugh Bateman, of Harrington, in that county, by whom he had two sons, William and Thomas; Thomas, the second son, married Anne, daughter and co-heir of Robert Venables, of Winelam, in Derbyshire, and their only son was Thomas, first Earl of Macclesfield."

[2] *Lives of the Lord Chancellors*, Vol. IV. p. 565.

you rascal, those eleven days which your father stole from us."

Lord Macclesfield rendered the Society good service as their President. One of his first official acts was, to deliver an eulogium on his predecessor, Mr. Folkes, in which he dwelt forcibly on his zeal and energy in the performance of the duties of President. His Lordship, as his successor, faithfully discharged these, and diligently devoted himself, during the twelve years that he was in office, to the task of raising the scientific rank of the Society, in which, it is admitted by all, he succeeded[3]. He contributed mathematical and astronomical Papers to the *Transactions*, and afforded the necessary means for observing the transit of Venus in 1761, at his seat, (Shirburn Castle, Oxfordshire), where he had accumulated a considerable number of astronomical instruments[4]. Of these, and

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[3] Stukeley says, that as soon as Lord Macclesfield was elected, he "entreated the assistance of the Fellows to enable him to keep up the dignity of the Society."

[4] Professor Rigaud states, that the Observatory at Shirburn Castle was erected about 1739. "It stood 100 yards south from the gate of the Castle, and a little to the west of it. It was not erected for mere amusement. It consisted of three rooms; one was fitted up for his Lordship's accommodation as a bed-chamber, which he occasionally occupied when he passed the night in his observations. A second contained the transit, and the third a mural quadrant. His Lordship at first, with the occasional aid of Bradley, made the observations for himself, but in January, 1742, he admitted an old servant of the family to work under him." *Memoir of Bradley*, p. 83. There is a curious and rather scarce engraving in the possession of the Royal Astronomical Society, representing two of Lord Macclesfield's servants in the act of making observations at the Shirburn Observatory. They are described as Thomas Phelps, aged 82; "who from being a stable-boy in the year 1718, to the then Lord Chief Justice Parker, afterwards Earl of

Mac-the patronage accorded by Lord Macclesfield to science, Bradley makes honourable mention in his Paper on Nutation, which was communicated to the Royal Society in a letter addressed to his Lordship:—

"The advantages arising from different persons attempting to settle the same points of astronomy near the same time, are so much the greater, as a concurrence in the result would remove all suspicion of incorrectness in the instruments made use of. For which reason I esteem the curious apparatus at Shirburn Castle, and the observations there taking, as a most valuable criterion whereby I may judge of the accuracy of those made at the Royal Observatory; and, as a lover of science, I cannot but wish that our nation abounded with more frequent examples of persons, of like rank and ability with your lordship, equally desirous of promoting this, as well as every other branch of natural knowledge that tends to the honour and benefit of our country.

"But were the patrons of art ever so numerous, the subject of my present letter is of such a nature, as must direct me to beg leave to address it to the Earl of Macclesfield; not only as a most competent judge of it,

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Macclesfield, rose by his merit to the upper employments in that family, and at last, for his uncommon genius, was promoted to be observer, in their Observatory, at Shirburn Castle;" and John Bartlett, "aged 54, originally a shepherd, in which station he by books and observation acquired such a knowledge in computation, and of the heavenly bodies, as induced the late George, Earl of Macclesfield, to appoint him assistant observer in his Observatory." At the back of the picture is a manuscript note stating, that "Thomas Phelps was the person, who, on the 23rd December, 1743, discovered the great comet, and made the first observation of it, an account of which is entered in the *Philosophical Transactions*, but not the name of the observer."

but as the sole person in this nation that hath instruments proper to examine into the truth of the facts here related.

"And it is a particular satisfaction to me, that, after so long an attendance upon these phenomena, I am allowed the honour of transmitting the account of them to the public through your lordship's hands; as it gives me, at the same time, an opportunity of professing the grateful sense I shall ever retain, both of the signal favours which I formerly received from the noble Earl, your father, and of the many recent obligations conferred by yourself upon me[5]."

The intimacy of Lord Macclesfield and Bradley began when they were both young, and was probably much promoted by their fondness for astronomy. Professor Rigaud states, that there exists in the Savilian Library at Oxford a transcript, made previously to 1725, of the right ascensions and declinations of all the stars in the *British Catalogue*, as they stand in the first edition of the *Historia Cœlestis*, the R.A. having been reduced to time; the whole written by the joint labour of Bradley and of his noble friend Lord Macclesfield[6].

This patron of science, as recorded in one of the

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[5] *Memoir of Bradley*, p. 82.

[6] Besides regular observations of the sun, moon, and planets, Bradley employed himself on the observation of a great number of small stars. The celebrated Prussian Astronomer, Bessel, deduced from Bradley's observations the places of all the stars therein contained, and published the results in the *Fundamenta Astronomiæ*, *&c.*, a work in which Bessel was assisted by the English Board of Longitude with a grant of money. The number of stars in this valuable catalogue deduced from Bradley's observations is 3222.

Shirburn observation books, died on the morning of the 17th March, 1764, occupied, as will be seen, to the last, with the affairs of the Society. A portrait of his Lordship, painted by T. Hudson, is in the Meeting-room.

In 1753, the present Society of Arts was established, though the first public Meeting did not take place until March 1754. The plan, which has been styled "one of the noblest for the improvement of the general commerce of Great Britain which could probably have been devised[7], is generally stated to have been formed by Mr. William Shipley, a drawing-master, whose public spirit seems to have been very superior to his station of life, and who acted for some time as Secretary to the Society.

It appears, however, that long before 1753 an idea was entertained of establishing a Society of Arts, as there is a minute of Council of the Royal Society, dated October 20, 1738, to this effect:

"A letter from Dr. Peck to the President (Sir Hans Sloane) was read, conveying a proposal to the Society for raising a stock of One Thousand Pounds sterling by way of subscription, for the encouragement of arts and sciences; which, with two other letters relating to the same, one on the 9th, and the other on the 14th, October, were also read. And the contents thereof being considered, it was agreed that he should be informed that this Society cannot, as a Society, assist in the establishment of such a foundation, nor will they give any interruption to the design of any other Society, which the proposer now seems to be in hopes may be formed thereon[8]."

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[7] Anderson, *History of Commerce*, Vol. III. p. 298.

[8] Vol. III. p. 198.

No Society of the description mentioned in this minute was formed at that period; but in 1753, as has been stated, the Society of Arts, having for its design the promotion of Arts, Manufactures, and Commerce, was instituted. Lords Folkestone and Romney, and Stephen Hales[9], were amongst the most active supporters of the new association, though Mr. Shipley is acknowledged by the Society to have originated it. In 1758, a gold medal was voted to him "for his public spirit, which gave rise to the Society;" and his portrait appears as a frontispiece to the fourth volume of their *Transactions*, with a similar acknowledgment of his services.

The Society began, immediately after its formation, to advertise premiums for improvements in Arts and Manufactures, in which it persevered for many years. The Royal Society do not appear to have been in any correspondence with it; indeed, since the practice of carrying on experiments fell into disuse, the objects of the two Societies have had but little in common.

In 1756, the Society elected into their body Benjamin Franklin[10], who had contributed some valuable

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[9] This gentleman was a distinguished Fellow of the Royal Society. His genius was of a very practical turn: most of his numerous inventions and writings refer to some direct application of science to daily use. There are several Papers by him in the *Philosophical Transactions*. A memoir of him by Mr. Collinson, will be found in the *Annual Register*, 1764.

[10] Dr. Franklin gives the following account of his election to his son, Governor Franklin:

"*Dec.* 19, 1767.

...... "I had an opportunity of looking over the old Council-books and Journals of the Society, and having a curiosity to see how I came in, (of which I had never been informed,) I looked back for the original communications to the *Transactions*, particularly the account of his electrical kite, which excited great interest[11]. At the time of his elec-

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he minutes relating to it. You must know that it is not usual to admit persons that have not requested to be admitted; and a recommendatory certificate in favour of the candidate, signed by, at least, three of the members, is by one rule to be presented to the Society, expressing that he is desirous of that honor, and is so and so qualified. As I never had asked or expected that honor, I was, as I said before, curious to see how the business was managed. I found that the certificate, worded very advantageously for me, was signed by Lord Macclesfield, their President, Lord Parker, and Lord Willoughby, that the election was by an unanimous vote; and the honour being voluntarily conferred by the Society unsolicited by me, it was thought wrong to demand or receive the usual fees or composition; so that my name was entered in the list with a vote of the Council, that I was not to pay any thing. And, accordingly, nothing has ever been demanded of me. In my case, a substantial favor accompanied the honor." Franklin's certificate runs thus: "Benjamin Franklin, Esq., of Philadelphia, a gentleman who has very eminently distinguished himself by various discoveries in natural philosophy, and who first suggested the experiments to prove the analogy between lightning and electricity, being desirous of being elected a Fellow of the Royal Society, is recommended by us, in consideration of his great merit, and of his many communications, as highly deserving the honor he desires.

(Signed), "MACCLESFIELD, PARKER, WILLOUGHBY, P. COLLINSON, W. WATSON, THOMAS BIRCH, JAMES PARSONS, JOHN CANTON."

—Franklin's *Works*, Vol. I. p. 242.

[11] Published in the 47th volume of the *Transactions*. In 1753, he had received the Copley Medal, on which occasion the Earl of Macclesfield, in his address to the Society at the Anniversary Meeting, stated, that "the Council could not overlook the merit of Benjamin Franklin, of Pennsylvania; for though he be not a Fellow of this Society, nor an inhabitant of this island, is a subject of the Crown of Great Britain, and must be acknowledged to have deserved well of the philosophical world, and of this learned body in particular, to whom he has at various times caused to be communicated

tion he was in America, which prevented him signing the Charter-book within the required time; but the Council, fully aware of his brilliant talents, unanimously resolved, on the motion of Mr. William Watson, that "the name of Benjamin Franklin, who has deserved so highly of the Society, and whose affairs oblige him to reside at Philadelphia, be inserted in the lists before his admission, and without any fee, or other payment to the Society; and that such name be continued in the lists so long as he shall continue to reside abroad."

The Presidency of the Earl of Macclesfield was rich in scientific discoveries and communications made by Fellows of the Royal Society. The most important were those by Lord Charles Cavendish, and Mr. John Dollond, the celebrated discoverer of achromatic lenses. In 1757, the Society awarded the Copley Medal to Cavendish, for "his curious invention of making thermometers shewing respectively the greatest degrees of heat and cold which have happened at any time during the absence of the observer;" and in 1758, the Medal was given to Dollond, "for his curious experiments and discoveries concerning the different refrangibility of the rays of light, communicated to the Society[12]."

The Rev. John Michell's papers "On the Cause and Phenomena of Earthquakes," published in the *Philosophical Transactions* in 1760, also merit passing

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many of the experiments he has made, and of which you have lately received a large collection." Journal-book, Vol. XXII. p. 414. In 1760, Franklin was elected into the Council, and took his seat on the 8th Dec. in that year.

[12] Dollond's discovery is published in the *Philosophical Transactions* for 1758.

notice, as containing many observations anticipating, in a remarkable manner, theories established nearly half a century afterwards. "His attention," says Mr. Lyell, "had been drawn to the phenomena of Earthquakes, by the great earthquake of Lisbon in 1755. He advanced many original and philosophical views respecting the propagation of subterranean movements, and the caverns and fissures wherein steam might be generated. In order to point out the application of his theory to the structure of the globe, he was led to describe the arrangement and disturbance of the strata, their usual horizontality in low countries, and their contortions and fractured state in the neighbourhood of mountain-chains. He also explained with surprising accuracy the relations of central ridges of older rocks, to the long narrow slips of similar earth, stones, and minerals, which are parallel to these ridges. In his generalizations, derived in great part from his own observations on the geological structure of Yorkshire, he anticipated many of the views more fully developed by later naturalists[13]."

Michell was Woodwardian Professor of Mineralogy at Cambridge; he, however, held the chair only eight years, relinquishing it and his scientific pursuits on obtaining church-preferment; "exemplifying," in the words of the author just quoted, "the working of a system still in force at Oxford and Cambridge, where the chairs of mathematics, natural philosophy, chemistry, botany, astronomy, geology, mineralogy, and others, being frequently filled by clergymen, the reward of success disqualifies them, if they conscientiously discharge their new duties, from farther advancing the cause of science, and that, too, at the moment when their labours would naturally bear the richest fruits."

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[13] *Principles of Geology*, 7th edit., p. 43.

In the early part of 1760, the Society commenced taking active measures for the purpose of observing the transit of Venus, which Halley had foretold would occur in 1761[14]. The importance of this transit, as the means of determining the sun's distance from the earth, was such as to constitute this period one of the most memorable in the history of astronomy during the eighteenth century. The transits of Venus are rare; the first observed was that of November 24, 1639, predicted by Horrox, and observed by him and Crabtree. The next two transits were in 1761 and 1769.

The following Memorial to the Lords of the Treasury, evinces that the Royal Society were not behind other scientific bodies in Europe, in duly appreciating the necessity of observing this phenomenon.

"*The Memorial of the President, Council, and Fellows of the Royal Society of London for improving natural knowledge:*

"HUMBLY SHEWETH,

"THAT whereas the French, and several other Courts of Europe, are now sending proper persons to proper places in various parts of the world, to observe, for the improvement of astronomy, the Transit of Venus over the Sun, which will happen on the 6th June, next[15]. And whereas this nation is more immediately concerned in this event, predicted in the last century by an Englishman, Dr. Halley, His Majesty's late Astronomer-Royal, and never observed but once before since the world began, and then only by another Englishman, the ingenious Mr. Horrox; and whereas the expenses of this most laudable undertaking, in which the honour of this nation is thus principally concerned, appears, upon an estimate of the charges thereof, to be eight hundred pounds, if only two persons be sent with the necessary instruments to the island of St. Helena only; and if the like number be also sent to Bencoolen, which is very much to be desired, will amount in the whole to near double that sum[16]: the least of which sums is disproportionate to the circumstances of this Society; the said President, Council, and Fellows, do therefore humbly request your Lordships to intercede with His Majesty, that he would be most graciously pleased to enable them to carry the said design into execution, in such manner as to His Majesty in his great wisdom shall seem proper[17]."

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[14] His Paper on this and other transits is published in the 29th volume of the *Transactions*. In it he implores the astronomers who should be alive at that period not to neglect observing the transit of Venus.

[15] The Memorial is dated July 1760.

In order to give additional weight to this memorial, the President wrote to the Duke of Newcastle:—

"My Lord Duke, "*St. James's Square*, 5 *July*, 1760.

"I did myself the honour this morning of calling at your Grace's door, with an intent to lay before you the inclosed copy of a memorial which, I believe, will be presented to the Lords Commissioners of the Treasury, at their next Meeting. But, finding that your Grace was gone out of town, I take the liberty of sending it herewith, in order that your Grace may be apprized of the nature of that Memorial, before it be delivered at the Board.

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[16] Detailed estimates of the probable expense of the expedition had been prepared.

[17] Council-book, Vol. iv. p. 229.

"The Memorial itself plainly shews that the motives on which it is founded are the improvement of Astronomy, and the honour of this nation; which seems to be more particularly concerned in the exact observation of this rare phenomenon, that was never observed but by one Englishman, and the time of its return computed and the proper places and manner of observing it, together with the use of those observations, pointed out and illustrated by Dr. Halley, another Englishman. And it might afford too just ground to foreigners for reproaching this nation in general (not inferior to any other in every branch of learning, and more especially in Astronomy), if, while the French King is sending observers for this purpose, not only to Pondicherie and the Cape of Good Hope, but also to the northern parts of Siberia; and the Court of Russia are doing the same to the most eastern confines of the Greater Tartary; not to mention the several observers who are going to various places, on the same errand, from different parts of Europe;—England should neglect to send observers to such places as are most proper for that purpose, and subject to the Crown of Great Britain. This is, by foreign countries in general, expected from us; because the use that may be derived from this phenomenon will be proportionate to the number of distant places, whose proper observations can and shall be made of it: and the Royal Society being extremely desirous of satisfying the universal expectations of the world in this respect, have thought it incumbent upon them to lay this matter before your Grace, who is so great a patron of learning, and to request your effectual intercession with His Majesty, that he would be graciously pleased to enable them, in such manner as His Majesty shall think fit, to accomplish this their desire, and to answer the expectation of the world; which, as the memorial truly sets forth, would be attended with an expense disproportionate to the narrow circumstances of the Society. But, were the Royal Society in a much more affluent state, it would surely tend more to the honour of His Majesty and of the nation in general, that an expense of this sort, designed to promote science and to answer the general expectation of the world, should not be borne by any particular set of private persons. The Society therefore flatter themselves, that through His Majesty's great goodness and remarkable regard for the honour of this nation, and your Grace's kind intercession for that end, their hopes will not be frustrated. I beg leave to add, that no time is to be lost; and that it is absolutely necessary that we should be honoured with His Majesty's (our Patron's) answer as soon as may be: because preparations must be immediately set about, in order to prevent the observers arriving too late at the respective places of their destination, which a little delay might occasion. "I am, &c.

"Macclesfield.

"*The Duke of Newcastle.*"

The result of these applications and representations was, that the Society received an order on the Treasury for 1600*l.*, being 800*l.* to defray the cost of the expedition to St. Helena, and a similar sum for that to Bencoolen. The Council lost no time in selecting observers for the purposes of the expedition, and appointed the Rev. Nevil Maskelyne to proceed to St. Helena[18], and Messrs. Mason and Dixon to

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[18] Maskelyne's estimate of expenses, which he drew up, and personally laid before the Council, is a curious document: the large sum

Bencoolen. Suitable instruments were ordered to be made, and the Admiralty complied with the request of the Council, providing a ship-of-war (the *Sea-Horse*) to take out the observers.

Maskelyne, however, sailed in another vessel; he arrived safely at St. Helena, but, unfortunately, from the unfavourable state of the weather, was prevented making a complete set of observations. In his account of these, published in the 52nd volume of the *Transactions*, he says, "From the very cloudy weather which prevailed here during the whole month preceding the transit, I indeed almost despaired of obtaining any sight of it at all. I was, however, fortunate enough to obtain two fair views, though but of short continuance, of this curious celestial phenomenon."

But though thus unsuccessful in the primary object of his expedition, Maskelyne, by other observations, rendered great service to navigation, as he promoted the introduction of lunar observations for ascertaining

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"for liquors" will cause some surprise in these temperate times; we may observe that the estimate was agreed to.

	£.	s.	d.
Boarding at St. Helena, at six shillings per day, for one year	109	10	0
Liquors at five shillings per day, for same time	91	5	0
Washing at ninepence per day	13	13	9
Other expenses and incidental charges, at one shilling and sixpence per day	27	7	6
	241	16	3
Liquors on board of ship for three months' going, and three months coming back	50	0	0
Total expenses for one year	290	16	3

Independently of the foregoing, Maskelyne was paid 150*l*. for the expedition; Messrs. Mason and Dixon 100*l*. each.

the longitude[19]. "*S'il eut le chagrin de voir tous ses projets renversés,*" says Delambre, "*sans qu'il-y-eut de sa faute, il sut du moins rendre, sa traversée utile à la science des longitudes; il fit l'essai des différentes méthodes qu'on avait proposées pour ce problême; il confirma toutes les conclusions tirée par La Caille en faveur des distances de la lune au soleil, et comme il avait en sa possession des instrumens beaucoup plus précis, il put assurer que les erreurs de la méthode étaient renfermées dans des limites bien plus étroites. Il donna des formules nouvelles pour calculer ces observations, et poussa même le scrupule jusqu'à calculer séparément, d'abord l'effet de la réfraction, et puis celui de la parallaxe*[20]."

The expedition of Messrs. Mason and Dixon proved very unfortunate: they had scarcely left the shores of England, when the *Sea-Horse* engaged a French frigate; the particulars of the action are amusingly described in the following letter from Mr. Mason to the Secretary of the Society:—

"SIR, "*Plymouth, the* 12*th of January*, 1761.

"I BEG the favour you would be pleased to acquaint the Council of the Royal Society, that on Saturday last, at eleven in the morning, 34 leagues S.W. ½ 10, from the Startpoint, we engaged the *Le Grand*, a thirty-four gun frigate, when, after an obstinate dispute of about an hour and a quarter, Monsieur thought proper to run as fast as possible: after chasing some time in vain, the captain steered for this port to refit. In the action we had eleven men killed, and thirty-seven wounded, many of whom, I believe, mortally. It is allowed by all, that Captain Smith commanded with the greatest prudence and courage, and that his officers behaved (in a manner) deserving the highest notice. All our masts are wounded, and to refit the ship will take up so much time, that, in my opinion, it will be impossible for us to arrive in India in time to make the observation; and therefore must desire you will please by a line, as soon as possible, to acquaint me in what manner the Council would please to have us proceed.

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[19] On Maskelyne's return to England, he published the *British Mariner's Guide*, and established the *Nautical Almanack*.

[20] *Notice sur la Vie et les Travaux de Maskelyne*, p. 6.

"I am, &c.

"C. Mason.

"P. S. The stands for our instruments are tore very much; but the clock, quadrant, telescopes, &c. are not damaged that I can find."

Other letters were received from Mr. Mason and his companion, by which it appears that the horrors of war had so effectually damped their courage and scientific ardour, that they declined proceeding to Bencoolen. The Council having taken these letters into consideration, addressed the following remonstrance to the timid astronomers:—

"The Council are extremely surprised at your declining to pursue your voyage to Bencoolen, which you have so solemnly undertaken, and have actually received several sums of money upon account of your expenses, and in earnest of performing your contract. That your refusal to proceed upon this voyage, after having so publicly and notoriously engaged in it, will be a reproach to the nation in general; to the Royal Society in particular; and, more especially and fatally, to yourselves: and that, after the Crown has been graciously and generously pleased to encourage this undertaking by a grant of money towards carrying it on; and the Lords of the Admiralty to fit out a ship of war, on purpose to carry you to Bencoolen; and after the expectation of this and various other nations has been raised to attend the event of your voyage; your declining it at this critical juncture, when it is too late to supply your places—cannot fail to bring an indelible scandal upon your character, and probably end in your utter ruin.

"In case you shall persist in your refusal, or voluntarily frustrate the end, and disappoint the intention of your voyage, or take any steps to thwart it; you may assure yourselves of being treated by the Council with the most inflexible resentment, and prosecuted with the utmost severity of the law. To prevent all possibility of doubt concerning your undertaking the voyage, or omitting to go, the Council do absolutely and expressly direct and require you to go on board the *Sea-Horse*, and enter upon the voyage, be the event as it may fall out.

"P.S. As winds and other circumstances may render it uncertain whether you can arrive at Bencoolen within time, and as those circumstances cannot at present be sufficiently foreseen, it must be left to your discretion when you are upon your voyage, to act in the best manner for effectually answering the ends of your designation, whenever your circumstances, now uncertain and eventual, shall happen to be reduced to certainty: in which case you are to follow the directions of the captain, who has instructions upon this head."

These imperative remonstrances and orders had the desired effect[21]. At length the observers started:

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[21] It is stated in the Journal-books, that in consequence of Messrs. Mason and Dixon's unwillingness to embark again, the *Sea-*

but so much time had been lost in refitting the vessel, that, apprehensive of not reaching Bencoolen in sufficient time, they stopped at the Cape of Good Hope, and observed the transit there.

Various observations of this phenomenon were made in England, at the recommendation of the Royal Society; among which were those of Mr. Hornsby and Mr. Phelps, at Shirburn Castle, the seat of Lord Macclesfield[22]. After the observations had been collected, Messrs. Short and Hornsby drew up two excellent Papers, deducing from the whole the solar parallax, which they found very nearly $8''\cdot 52$[23].

During these interesting proceedings, a circumstance occurred of considerable importance to the Society; the accession of George III. to the throne. The reign of this Monarch has been not inappropriately entitled "the Augustan age of modern history;" but it is right to add, that its glories were not confined to the statesmen, warriors, and orators, who dazzled the world, and Europe in particular, by their achievements and genius. Science was not without her representatives; and it is honorable to the character of George III. that its study and advancement were always objects of his deep interest and solicitude. His Majesty ascended the throne in October, 1760, and in the succeeding month the Society drew up the accompanying Address:—

Horse was ordered elsewhere; but the arrival of the above letter brought the observers to their senses, and the Admiralty cancelled their orders.

[22] There are twenty-six Papers on the Transit of Venus in 1761, in the *Transactions*.

[23] Published in the 52nd volume of the *Transactions*.

"*The humble Address of the President, Council, and Fellows of the Royal Society of London for improving Natural Knowledge.*

"MOST GRACIOUS SOVEREIGN,

"WE, your Majesty's most dutiful and loyal subjects, beg leave to approach your sacred Person, to condole in the most respectful manner with your Majesty, on the death of your Royal Grandfather; and, at the same time, to express our unfeigned joy on your Majesty's happy succession to the Imperial Crown of these Kingdoms.

"Sharers as we are with the rest of our fellow-subjects in the general grief, arising from the great loss which the public has sustained by the death of our late excellent and glorious Sovereign, we have the additional concern of being thereby deprived of a most gracious Patron and generous Benefactor.

"We therefore most humbly entreat your Majesty to take this Society into your Royal Patronage and Protection; and as your Majesty's known piety, and other eminent virtues, afford us the most pleasing prospect of your completely repairing the late national loss, your Majesty's remarkable love of science in general, and particularly of those branches of it which are the peculiar object of our studies, and the improvement whereof was the principal design of our institution, gives us the most sanguine hopes that your Majesty will be graciously pleased to comply with this our request, and honour us with your Royal Name in our Register, as our Patron, among those of your Royal Predecessors.

"That your Majesty's reign may be long, happy, and glorious; and that you may ever rule in the hearts, as well as over the persons, of a free, affectionate, and grateful people, is the earnest wish and ardent prayer of your Majesty's loyal subjects, the President, Council, and Fellows of the Royal Society of London[24]."

Through the medium of Mr. Pitt, F.R.S., then one of the Secretaries of State, the King acquainted the President, that he would receive him and a deputation of the Society on the 17th November, 1760; and on that day, the Earl of Macclesfield, with several Fellows, waited on his Majesty, when, according to the President's statement, "the King was pleased to receive them very graciously, all the Members had the honour of kissing his hand; and His Majesty afterwards sent for the President into his closet, and signed his royal name in the Charter-book, as Patron of the Society, and was pleased to express a great regard for the good of the Society[25]."

The love which George III. had exhibited for the fine and mechanical arts[26], was alone sufficient to cause him to regard the Royal Society, of which he thus officially declared himself to be the Patron, with considerable interest. The history of the Society during his reign affords ample confirmation of this.

In the early part of 1763, the Society, at an ordinary Meeting, passed a resolution urging the Council to take immediate steps to obtain possession of the Observations made at Greenwich, for the purpose of publishing them in the *Transactions*[27]. This object, in which the Earl of Macclesfield was much interested, would probably have been immediately effected, had his Lordship's life been spared. Illness of a very alarming nature attacked him in April, 1763, on the 21st of which month he presided for the last time at the Council. The consideration of the Grèenwich Observations was deferred from Council to Council, in hopes of the President's recovery, but he eventually sunk under his disease, and died on the 17th March, 1764. His death was severely felt by the Society, and the scientific world lost in this nobleman a sincere and zealous friend. A Council, specially summoned for the election of a new President, made choice of the Earl of Morton, which choice was confirmed by the Society at the ensuing Anniversary.

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[24] Journal-book, Vol. xxiv. p. 641.

[25] A few days after, the Dukes of York and Cumberland were enrolled Fellows of the Society, and inscribed their names in the Charter-book.

[26] It was George III. who created and incorporated the Royal Academy, in Dec. 1768.

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[27] The observations of Bradley, and other Astronomers-Royal, were taken possession of by their executors. It appears by the Council-minutes, that the Society were very desirous that the Crown should enforce their right to them. Maskelyne's address to the Society, moving the above resolution, is extremely interesting and valuable, moreover, in a historical point of view.

CHAPTER II.

Memoir of Lord Morton—The Society draw up Regulations for the Astronomer-Royal—Appointed Visitors of the Observatory by George III.—Astronomical Observations printed—Messrs. Mason and Dixon engaged by the Society to measure a Degree of Latitude in North America—Maskelyne prepares the necessary Instructions—Canton exhibits his Experiments on the Compressibility of Water—Copley Medal awarded to him—Transit of Venus in 1769—Measures taken by the Society to observe the Transit—Petition to the King—His Majesty grants the Society 4000*l.* to defray the Expenses—The Astronomer-Royal prepares instructions for the Observers—Letter from him to Dr. Lind—Captain Cook and Mr. Green sent to the Pacific—Messrs. Dymond and Wales to Hudson's Bay—Sir Joseph Banks sails in the Expedition with Cook—Letters from Captain Cook—Account of the Observations—Solar Parallax deduced by Hornsby—Death of Lord Morton—James Burrow chosen President by the Council—Activity of the Society under the Presidency of Lord Morton—Presents made to the Museum—Composition for Subscriptions increased—The Election of Foreigners rendered more difficult—King of Denmark requests to be elected a Fellow of the Society.

1760—65.

JAMES, EARL OF MORTON[1], was born at Edinburgh in 1707. He was descended from the Douglas family, one of the most ancient and honourable in Scotland.

His education was commenced in that country, and completed at Cambridge. When he left the University he made the tour of the Continent, and profited so much by his travels, that on his return, his extensive knowledge and acquaintance with several sciences, procured him the attention of various philosophers. Amongst these was the celebrated Maclaurin, who became one of his most attached friends, and who conceived the idea of enlarging the plan of a Society, instituted at Edinburgh in 1731 for the improvement of medical knowledge, and extending it to subjects of philosophy and literature. In this he was warmly supported by Lord Morton. "The institution was accordingly remodelled in 1739, by a printed set of laws and regulations, the number of members was increased, and they were distinguished from that time by the title of the 'Society for improving Arts and Sciences,' or more generally, as the 'Philosophical Society of Edinburgh[2].'" They chose for their President the Earl of Morton, who was then only twenty-six years of age. The name of the Society was changed by charter, in 1783, to that of the "Royal Society of Edinburgh."

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[1] I am indebted to the *éloge* of Lord Morton, by M. Fouchy, in the *Histoire de l'Académie* for 1770, for the greater portion of this Memoir. It is not a little remarkable, that no biography of Lord Morton existed in the English language previously to this sketch, although he was President of the Royal and Edinburgh Philosophical Societies, and a man of varied scientific attainments.

From political causes, and the death of Maclaurin, the meetings of the Edinburgh Society were discontinued a few years after its institution, and thus Lord Morton was liberated from the duties of President.

His love for scientific pursuits was too great to permit him to remain in idle obscurity; accordingly we find him taking an active part in the affairs of the Royal Society. He had been elected a Fellow on the 19th April, 1733, and was chosen into the Council on the 30th November, 1763. He also contributed

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[2] *History of the Royal Society of Edinburgh*, p. 7.

Papers to the *Transactions*. In 1764, he was elected one of the eight Foreign Members of the French Academy, in the place of Lord Macclesfield, whom he succeeded in the chair of the Royal Society. "As soon," says his French eulogist, "as he attained this high dignity, he contracted a new engagement with the sciences, and particularly with the Royal Society; he paid the greatest attention to its affairs, used every means in his power to encourage discoveries, and increase scientific knowledge, and exercised such caution with respect to elections, that only those really capable of reflecting honour upon the Society were admitted into it. He also maintained great order at all the meetings."

Lord Morton was most actively engaged in the preparations which were made by the Royal Society to observe the transit of Venus, in 1769. As one of the Commissioners of Longitude, he attended regularly at the numerous meetings held on this occasion, and he was mainly instrumental in obtaining the vessels from government for the use of the expeditions.

He was one of the earliest Trustees of the British Museum, and was Keeper of the Records of Scotland. One of his last labours was drawing up a plan for the better preservation of the Archives in that country, which his death unfortunately prevented him from carrying into execution. This event occurred in 1768.

In 1742 Lord Morton obtained an Act of Parliament for vesting the Earldom of Orkney and Lordship of Zetland in James, Earl of Morton. This involved him in so many law-suits that he afterwards disposed of the whole of his property to Laurence Dundas[3].

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[3] Barry, *History of Orkney*, p. 260.

In 1746, when in France with his family, his lordship was imprisoned in the Bastile[4]. The cause of this imprisonment was never avowed. His lady and child, and a sister of the Countess of Morton, were also imprisoned with him. After being confined three months, they were allowed to remove to his own house in Paris, and being soon after permitted to leave the kingdom, they landed at Dover on the 3rd May, 1747.

Lord Morton was twice married; his first wife was Agatha, daughter of James Halyburton, of Pitcur, in the county of Forfar. She died in 1748, leaving six children.

His second wife was Bridget, eldest daughter of Sir John Heathcote, of Normanton, in Rutlandshire, by whom he had two children.

He was one of the sixteen representative peers for Scotland.

The conclusion of his *éloge*, by M. Fouchy, is too interesting to be omitted:—"Lord Morton was a true lover of science, and a warm friend of all who adorned it. He contracted a sincere and lasting friendship with those at the head of science and literature in France, whose acquaintance he had made during his travels; and whenever foreigners visited London, he not only offered them his services, but received them in his house, in a manner suitable to his rank, sparing no trouble to facilitate their researches. In short, it may be truly said, that no person ever existed who possessed the friendship and esteem of literary men more than he did, and who more deservedly enjoyed the confidence of his government[5]."

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[4] Douglas, *Scottish Peerage.*

[5] *Histoire de l'Académie* 1770.

Shortly after the election of Lord Morton, the Council again took the subject of the Greenwich Observations into their consideration; but as the Crown-lawyers were of opinion, "that the warrant of Queen Anne, appointing the President and Council of the Royal Society to be constant Visitors of the Observatory, did not subsist in the present Council, nor permit them to take any legal measures for the recovery of the Observations[6]," it was determined to memorialize the King, not only to give the Royal Society power over the Observatory, but also to pray His Majesty to give orders for the restitution to the Observatory of the former Observations. At the same time the subjoined regulations were submitted to His Majesty, relating to the duties of the office of Astronomer-Royal, which happened to be vacant[7].

"*Regulations for the due Execution of the Office of Astronomer-Royal, humbly proposed to His Majesty's consideration.*

"WHEREAS the end of the Institution, and continuation of this office, requires a constant, regular attendance of the Astronomer-Royal at the Observatory; it will be necessary that he do *bonâ fide* reside there; and that he do not accept of any office or employment, the duty whereof to be personally performed by him is incompatible with such *bonâ fide* residence; and that in case of absence above a few days from the said

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[6] Council-minutes, Vol. v. p. 28.

[7] By the death of Bliss, who was succeeded by Maskelyne. It will be remembered that Bradley died in 1762. There is a very curious account of a *post-mortem* examination made on Bradley's body, in the 25th volume of the Journal-book, p. 246. His death took place under singular circumstances.

Observatory, the reason of such absence shall be previously allowed by those who are, or shall hereafter be, appointed Visitors of the Royal Observatory.

"2. That the Astronomer-Royal and his Assistant shall never be absent from the Observatory both at the same time.

"3. That no persons be admitted into the rooms of the Observatory, where the instruments are kept, unless the Astronomer-Royal, or his Assistant, shall be present; who are to take special care that no person be allowed to touch or handle the instruments, so as to endanger the spoiling thereof, or doing any damage thereto.

"4. And whereas great inconvenience hath arisen from admitting persons indiscriminately, for money, into the Observatory, whereby several of the instruments have been greatly damaged, and the Astronomer frequently interrupted in the course of his business; therefore, in order to prevent the like for the future: That from henceforth no money be taken from persons who are admitted to see the house or instruments.

"5. That the Astronomer-Royal shall distinctly and faithfully record all his Observations, in books kept for that purpose, and authenticate the same by the subscription of his name at the bottom of every page.

"6. That the Assistant Observer shall keep separate Books of the Observations he shall make, and authenticate the same in the manner above mentioned.

"7. That these Books of Observations shall never be removed from the Royal Observatory upon any pretence whatsoever; but shall remain there for the use of astronomers.

"8. That true and fair copies of the annual Observations made by the Astronomer-Royal, and his Assistant, shall be transmitted within six months after the year shall be elapsed, to the Council of the Royal Society.

"9. That the Astronomer-Royal and his Assistant shall follow such directions in the execution of their offices as, from time to time, shall be given by those who are already, or shall hereafter be, appointed Visitors of the Royal Observatory."

The King at once acceded to the prayer of the Society, and appointed the Visitors of the Observatory by the following Warrant:

"George R.

"Trusty and well-beloved, We greet you well. Whereas we have been given to understand that it would contribute very much to the improvement of Astronomy and Navigation, if we should appoint regular Visitors of our Royal Observatory at Greenwich, with sufficient powers for the due execution of that trust; We have therefore thought fit, in consideration of the great learning, experience, and other necessary qualifications of Our Royal Society, to constitute and appoint, as we do by these Presents constitute and appoint, you the President, and in your absence, the Vice-President, of our Royal Society for the time being, together with such others as the Council of our said Royal Society shall, from time to time, think fit to join with you, to be regular Visitors of our said Royal Observatory at Greenwich, during our pleasure; authorizing and requiring you to demand of our Astronomer and Keeper of our said Observatory, for the time being, to deliver to you within six months after every year shall be elapsed, a true and fair copy of the annual Observations he shall have made; and our farther will and pleasure is, that you do likewise, from time to time, order and direct our said Astronomer and Keeper of our said Royal Observatory, to make such Astronomical Observations as you, in your judgment, shall think proper; and that you do survey and inspect our instruments in our said Observatory, and, as often as you shall find any of them defective, that you do inform the principal officers of our Ordnance thereof, that so the said instruments may be either exchanged or repaired. And for so doing this shall be your Warrant; and so we bid you farewell. Given at our Court at St. James's, the twenty-second day of February, 1765, in the fifth year of our Reign. To our trusty and well-beloved the President of our Royal Society for the time being.

"By His Majesty's Command,

"SANDWICH."

At the same time, His Majesty ordered the Astronomer-Royal to obey the regulations drawn up by the Society, and the Master-General of the Ordnance was directed to furnish or repair such instruments for the Observatory as the Council thought necessary.

The newly-appointed Visitors found abundant occupation in examining the instruments, which appear to have been in a very dilapidated state, and replacing them by others of a more modern and better construction, amongst which is enumerated a ten-foot telescope, of Dollond's "new invention."

The Society did not rest here; in 1767 they petitioned the King to print the Observations, which Maskelyne had regularly transmitted to them, and again received a favourable reply; his Majesty having directed the annexed letter to be sent to the Master-General of the Ordnance:

"MY LORD, "*Whitehall*, 21 *July*, 1767.

"I HAVE his Majesty's commands to signify to your Lordship his pleasure, that you should pay such bills for printing the Observations made at His Royal Observatory at Greenwich, as shall be certified to you by the Council of the Royal Society, provided the same do not exceed the sum of 60*l.* in one year[8].

"I am, &c.

"SHELBOURNE."

In 1765, Messrs Mason and Dixon were engaged by government to survey and describe some boundary lines in America; and the Council, conceiving this a good opportunity to obtain the precise measure of a degree of latitude, addressed a letter to those gentlemen, proposing to them to undertake the task.

The proposition was acceded to, and Messrs. Mason and Dixon, sent in a statement of the mode in which they proposed executing the labour, and the amount of remuneration they expected[9]. The Council resolved to employ them, and requested Maskelyne (Astronomer-Royal) to draw up instructions for them; which, as well as several new instruments, were dispatched to New York[10].

At the Anniversary, in 1765, the Copley Medal was awarded to Mr. Canton, for his Paper entitled, "Experiments to prove that Water is not incompressible[11]." These trials, which refute the celebrated Florentine experiment, were made before the Society in 1762, but some objections having been advanced against them and the truth of Canton's theory, the Council resolved that the experiments should be repeated, at the expense of the Society, before a Committee appointed for that purpose. Lord Morton, on the occasion of delivering the Medal to Canton, gave an interesting account of the verification of these experiments, and expressed his hope that the author "would continue his ingenious researches to the advancement of natural knowledge."

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[8] The annual cost of printing the Observations was estimated by the Council at 45*l.* Maskelyne co-operated most zealously with the Society.

[9] They computed the time, which the survey would occupy, at four months; their charge was 200*l.* Their letter, which is of a very interesting nature, is in the Archives of the Society.

[10] A long and elaborate Paper by Messrs. Mason and Dixon, on the means they employed to determine a degree of latitude, and a supplementary Paper on the same subject by the Astronomer-Royal, are published in the 58th volume of the *Transactions*.

It will be remembered that several circumstances conspired to make the observations of the transit of Venus in 1761 unsatisfactory; consequently, the transit of this planet in 1769 was looked forward to with great anticipations by astronomers. As early as June, 1766, the Council resolved on using the most active exertions to engage competent observers, and they recalled all their instruments for the purpose of putting them in proper order[12]. Many discussions were held concerning the most eligible localities for observing the transit, in which the Astronomer-Royal took a prominent part. The result of these deliberations will be gathered from a Memorial to the King, which was presented to his Majesty in February, 1768.

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[11] *Phil. Trans.*, Vol. LII. p. 640. See also a Paper by Lord Charles Cavendish, on Mr. Canton's experiments, in the Journal-book, Vol. XXVI. p. 326. His Lordship was a warm and able defender of Canton.

[12] It is worthy of mention, that the Elector Palatine paid the Society the compliment of placing his Astronomer, Father Meyer, under their directions.

"To the King's Most Excellent Majesty.

"*The Memorial of the President, Council, and Fellows, of the Royal Society of London, for improving Natural Knowledge.*

"Humbly Sheweth,

"That the passage of the Planet Venus over the disc of the Sun, which will happen on the 3rd of June, in the year 1769, is a phenomenon that must, if the same be accurately observed in proper places, contribute greatly to the improvement of Astronomy, on which Navigation so much depends.

"That several of the great powers in Europe, particularly the French, Spaniards, Danes, and Swedes, are making the proper dispositions for the observation thereof; and the Empress of Russia has given directions for having the same observed in many different places of her extensive dominions.

"That the like appearance, after the 3rd of June, 1769, will not happen for more than 100 years.

"That, as far as appears from the history of Astronomy, Mr. Jeremiah Horrox (an Englishman) seems to have been the first person since the creation of the world, who calculated the passage of that Planet over the Sun's disc, and observed the same at the village of Hool, fifteen miles northward from Liverpool, on the 24th of November, O. S., in the year 1639.

"That the British nation have been justly celebrated in the learned world for their knowledge of Astronomy, in which they are inferior to no nation upon earth, ancient or modern; and it would cast dishonour upon them should they neglect to have correct observations made of this important phenomenon.

“That, by neglecting to take the necessary precautions in due time, the passage of the Planet in the year 1761 was not observed in some places from whence the greatest advantages might have redounded to the improvement of Astronomy.

“The Memorialists are humbly of opinion, that Spitzbergen, or the North Cape, in the higher northern latitudes; Fort Churchill, in Hudson’s Bay; and any place not exceeding 30 degrees of Southern latitude, and between the 140th and 180th degrees of longitude, West, from your Majesty’s Royal Observatory in Greenwich Park, would be proper stations for observing the ensuing transit, to each of which places two observers ought to be sent.

“That a correct set of Observations, made in a Southern latitude, would be of greater importance than many of those made in the Northern. But it would be necessary that the observers who are to pass the line, should take their departure from England early in the Spring; because it might be some time before they could fix upon a proper place for making the observations within the limits required.

“That the expense of having the Observations made in the places above specified, including a reasonable gratification to the persons employed, and furnishing them with such instruments as are still wanting, would amount to about 4000 pounds, exclusive of the expense of the ships which must convey and return the observers that are to be sent to the Southward of the Equinoxial Line, and to the North Cape.

“That the Royal Society are in no condition to defray this expense, their annual income being scarcely sufficient to carry on the necessary business of the Society.

"The Memorialists, attentive to the true end for which they were founded by your Majesty's Royal Predecessor, the Improvement of Natural Knowledge, conceive it to be their duty to lay their sentiments before your Majesty with all humility, and submit the same to your Majesty's Royal consideration."

It is gratifying to know that the King immediately granted the prayer of his memorialists. On the 24th March, 1768, the President acquainted the Society that his Majesty had ordered the sum of 4000*l*., clear of fees, to be paid to them, and that he had received that sum from the Treasury[13].

The Astronomer-Royal was directed to prepare the necessary instructions[14] for the observers, Lieutenant Cook and Mr. Green[15], who were sent to the Pacific; Messrs Dymond and Wales, to Hudson's Bay[16]; and Mr. Call to Madras. The Hudson's Bay Company

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[13] The surplus left, after paying all the expenses connected with the expeditions, was ordered by the King to be carried to the credit of the Society. With a portion of it the Society directed a marble bust of George III. to be executed by Nollekens, which is now in the Meeting-room.

[14] These are inserted in the Council-minutes, Vol. v. pp. 310—316.

[15] He had acted as assistant to Dr. Bradley at the Royal Observatory.

[16] In a Volume of Maskelyne's manuscript letters, preserved in the Archives of the Society, is the following communication addressed to Dr. James Lind, of Edinburgh, which throws some light on the Northern Expedition. It is dated Greenwich, Jan. 30, 1769:

"Your friends, Dr. Cooper and Mr. Cummins, called upon me yesterday, to acquaint me with your wish to be a party at your expense, in the observation of the transit of Venus, intended to be made to the northward, and to request my interest in forwarding your intentions, with Admiralty or Council of the Royal Society, as granted a passage in one of their vessels to the observers sent to their territories, and the Admiralty fitted out efficient vessels for the conveyance of the others.

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as might be most proper. As I have no doubt of Dr. Lind's ability for this business, so I want no other recommendation than his own merit, to induce me to propose him to the Council of the Royal Society as a proper person to assist in making these observations. I write this to acquaint you with my sentiments, and to inform you of the circumstances of the intended expeditions, which it may be proper for you to know, and upon which you may found your answer.

"It is proposed to send two observers, one to be landed at the North Cape, on the Island of Maggeroe, latitude 71°½, and the other at Cherry Island, latitude 74°. 40′, lying between the North Cape and Spitzbergen, about seventy leagues north of the former. A wooden Observatory, with a moveable roof, fit for one observer, together with a wooden dwelling-house twelve-foot square is provided for each place. The Admiralty have promised to furnish the observers with all necessary assistance, and I have recommended it to them, that five or six men of the ship may be left at each place with the observer. The captain of the ship's name is Douglass; the chaplain is desirous of making an observation, and insists on it he is well qualified so to do; so that, probably, the captain and chaplain together, with one of the observers, will observe at the North Cape, and the other observer will observe singly at Cherry Island, unless you shall think proper to join him, which I should wish. There is a road at Cherry Island, but we believe no harbour, therefore the ship leaves the observer with his attendants there, and goes into harbour at the North Cape. I design my assistant, William Bayley, to observe at Cherry Island, as the place where the sun will be highest, and where it is much more likely to be clear, being a small island in the open sea, than at the North Cape, at the mouth of so many rivers, and so much fresh water. This island is about nine miles long, and three or four broad. Excellent salad and scurvy-grass grows there, and there is plenty of wild fowl. What animals there are there, if any, I don't know, but rather believe there are none, not even bears. Mr. Van Heulen's Dutch Charts say, there are refreshments here for a hundred

The expedition to the Pacific had for its main, but not exclusive object, the observation of the transit by Mr. Green, and this was placed under the command of the celebrated Lieutenant James Cook, who hoisted his pendant in the *Endeavour*[17]. Nothing was wanting to make the necessary arrangements as complete as possible. Smeaton, whose name as an engineer of great ability was already well known, constructed portable observatories, which could easily be put together; and the instrument-makers of the greatest eminence were employed to make the numerous instruments[18].

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ships. Your skill in botany and natural history, which I shall represent to the Council, will probably find ample food and entertainment here, to your own credit and the advantage of the learned world." We may mention, that Dr. Lind did not join the expedition.

[17] The Council-minutes state, that Cook, then a Lieutenant, was appointed one of the observers to act with Mr. Green. He had a conference in the Council-room, and accepted the appointment, agreeing to the remuneration of one hundred guineas. Mr. Green received two hundred guineas. Alexander Dalrymple had originally been selected to take the command of the expedition, but the Admiralty declining to give him the brevet rank of Captain, upon which he insisted, his appointment was abandoned.

[18] The following is a list of the instruments provided for Cook's expedition:

"Two Reflecting Telescopes, each of two feet focus, with Dollond's Micrometer to one of them, and moveable wires for the other.
"Two wooden stands for the Telescopes, with polar axes.
"One Astronomical Quadrant, of one foot radius.
"An Astronomical Clock.
"An Alarum Clock.
"A Brass Hadley's Sextant.
"A Barometer.
"Two Thermometers.
"A Dipping Needle.

"1768,

Under these favourable auspices the English expeditions sailed for their appointed destinations. It is upon this occasion that the name of Mr. (afterwards Sir Joseph) Banks first appears in the Council-minutes. Having heard of the proposed expedition to the Pacific, he addressed a letter to the Council, requesting them to apply to the Lords of the Admiralty, to permit him to proceed with Lieutenant Cook[19] in the *Endeavour*.

The Council complied with his request, and in their official letter thus interceded in favour of Mr. Banks:

"The Council have appointed Mr. Charles Green, and Captain Cook, who is commander of the vessel, to be their observers; besides whom, Joseph Banks, Esq., Fellow of this Society, a gentleman of large fortune, who is well versed in natural history, being desirous of undertaking the same voyage, the Council very earnestly request their Lordships, that in regard to Mr. Banks's great personal merit, and for the advancement of

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"1768, July 21. Received from the Council of the Royal Society the Instruments in the above list, which we promise to deliver at the house of the Royal Society, upon our return to London, the dangers of the seas and other unavoidable accidents excepted.

(Signed) "Charles Green,
James Cook."

[19] Cook was originally an apprentice in a Whitby collier. In 1756, he volunteered into the Navy, and evinced so much skill and gallantry, as to be promoted to the office of Marine Surveyor of Newfoundland and Labrador. In the Navy he took rank as Lieutenant, until his return from the expedition under the auspices of the Royal Society, when he was made Captain. By a letter of Cook's, it appears that Mr. Banks was the first to inform him of his promotion.

useful knowledge, he also, together with his suite, being seven persons more, (that is eight in all), together with their baggage, be received on board of the ship in command of Captain Cook[20]."

The Admiralty consented to give Mr. Banks a passage in the *Endeavour*, and he forthwith made his preparations, which were on a large scale. He took with him Dr. Solander, a Swedish botanist of celebrity, two draughtsmen, and four servants, with everything necessary for their personal comfort, and the study of natural history.

The *Endeavour* sailed from Plymouth on the 26th August, 1768, and on the 13th September following anchored in Funchal Roads, off Madeira. Here they received considerable kindness, and after laying in a stock of provisions proceeded on their voyage on the 18th September[21].

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[20] Mr. Banks was only 25 years of age at this period; he was elected into the Society in 1766.

[21] It was from Funchal that the Council received the first intelligence of the *Endeavour*, by means of the following letter, which is preserved in the Archives:

"*Funchal*, 17*th Sept.*, 1768.

"My Lords and Gentlemen,

"I have this day drawn upon you in favour of Messrs. Scott and Co., for the sum of 64*l.* and in favour of Mr. R. Orton for the sum of 40*l.* 5*s.*, being for the purchase of wine and other necessaries for the use of Mr. Green and myself, and which I hope will meet with your approbation. I take this opportunity to acquaint you of the arrival of the *Endeavour* at this place on the 13th instant, and that she will put to sea again to-morrow.

"I am, &c.,

"James Cook.

"*To the President and Council*
of the Royal Society."

It is not the province of this work to follow Captain Cook and his companions throughout their voyage[22]. It must suffice to state, that having experienced a very inhospitable reception at Rio de Janeiro, where the Lieutenant put in for provisions[23], they continued their voyage to Terra del Fuego, and anchored for a few days in the Bay of Good Success. Here it was that Banks and his scientific friends nearly perished. They had been put on shore for the purpose of botanizing, and having ascended a mountain in search of plants, they were exposed to such an intense degree of cold that "Dr. Solander was seized with a torpor, which had nearly proved fatal, and two black servants actually died."

On the 11th April the *Endeavour* arrived in sight of Tahiti, and on the 13th came to an anchor in Port Royal Bay. Lieutenant Cook at once commenced the necessary arrangements for the observation of the Transit. On the 1st May the observatory was set up, and the astronomical quadrant with other instruments landed. On the following day it was found that the quadrant had been abstracted by the natives, although a sentinel had been stationed within a few yards of it during the night. Mr. Banks, who had acquired considerable influence over the aborigines, immediately volunteered to go into the woods in quest of the invaluable instrument, and was happily successful in recovering it.

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[22] For a detailed account, see Hawkesworth's *Voyages*, and Kippis's *Life of Cook*.

[23] It appears that the Brazilian Government were utterly unable to comprehend the object of the expedition. When the Viceroy was told that the English were bound to the southward to observe a transit of Venus, he could form no other conception of the matter than that it was the passing of the North Star through the South Pole!

"As the day approached for executing the grand purpose of the voyage, Lieutenant Cook determined, in consequence of some hints which he received from the Earl of Morton, (President of the Royal Society), to send out two parties to observe the transit of Venus from other situations. By this means he hoped that the success of the observation would be secured, if there should happen to be any failure at Otaheite. Accordingly, on Thursday the 1st of June, he despatched Mr. Gore, in the long boat to Eimeo, a neighbouring island, together with Mr. Monkhouse, and Mr. Sporing, a gentleman belonging to Mr. Banks. They were furnished by Mr Green with proper instruments. Mr. Banks himself chose to go upon this expedition, in which he was accompanied by Tubourai, Tamaide, and Tomio[24], and by others of the natives.

"Early the next morning the Lieutenant sent Mr. Hicks in the pinnace, with Mr. Clark and Mr. Pickersgill, and Mr. Saunders, one of the midshipmen, ordering them to fix upon some convenient spot to the eastward, at a distance from the principal observatory, where they might employ the instruments they were provided with for observing the transit.

"The anxiety for such weather as would be favourable to the success of the experiment was powerfully felt by all the parties concerned. They could not sleep in peace the preceding night; but their apprehensions were happily removed by the sun's rising, on the morning of the 3rd of June, without a cloud. The weather continued with equal clearness through the whole of the day, so that the observation was successfully made in every quarter. At the fort, where Lieutenant Cook, Mr. Green, and Dr. Solander were stationed, the whole passage of the planet Venus over the sun's disc was observed with great advantage[25]."

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[24] Chiefs remarkable for their attachment to Cook and his party.

It only remains to be added, with respect to this expedition, and those undertaken with the same objects, that the observations, with those of the other observers employed by the Royal Society, form the subject of a Paper in the 61st volume of the *Transactions*, drawn up by Mr. Hornsby, in which he makes the solar parallax, as deduced from these observations, to be 8″. 78, which, it will be remembered, does not differ essentially from the calculations by Short and Hornsby at the transit of 1761[26].

In October, 1768, the Council were summoned for the election of a President, in the place of the Earl of Morton, who died on the 12th of the same month. The choice of the Members present fell on Mr. (afterwards Sir James) Burrow, who remained in office until the ensuing Anniversary. An examination of the Journal and Register-books show that during the Presidency of the Earl of Morton, great activity prevailed in all the scientific departments of the Society, though, as we have seen, more attention was paid to astronomy than to other sciences.

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[25] Kippis, *Life of Cook*, p. 34.

[26] The *Transactions* for the years 1769 and 70 contain a great number of Papers by different individuals, on the transit; amongst others, one by Maskelyne, who observed it at Greenwich. See also a very able Paper on the Transit, by Don José Joaquin de Ferrar, a Spanish officer, in the 4th Volume of the *Memoirs of the Royal Astronomical Society*. "This gentleman," says Captain Smyth, "was a bright ornament of that powerful navy, which in our own times has passed away; and he must be placed in the very foremost rank of maritime savans." *Cycle of Celestial Objects*, Vol. I. p. 72.

The Museum, or Repository, as it continued to be designated, received many very valuable presents, amongst which was a very interesting collection of fossils from Russia. In the Report of the Inspectors of that department of the Society's property, made in 1767, it is stated, "a collection like yours, enriched with so many curiosities both natural and artificial, will do honour to yourselves, and to your country; as foreigners will view it with pleasure, and speak of it with applause[27]." There appear to have been a great number of models of machines, and curious instruments; and it is a matter of regret that these have not been preserved intact, as they would now form a collection of undoubted interest.

The increased ordinary expenses of the Society, still unmet by any grant from Government, obliged the Council to raise the composition-fees from twenty-one to twenty-six guineas. This change was made in 1766. The annual subscription remained 2*l.* 12*s.*[28] but although the composition was increased, as many candidates came forward as before, and the majority of newly-elected Fellows preferred becoming Life Members.

The election of foreigners into the Society was rendered much more difficult, by the Council resolving that every foreigner desirous of being elected, should present a certificate stating his qualifications; and that from the candidates a selection should be made annually of the two most eligible to be recommended to the Society for election. It may be mentioned, as a proof of the desire evinced by foreigners to become Members of the Society, that the King of Denmark, who visited England in 1768, sent a message to the Council by his ambassador, that "being full of the highest esteem for the Royal Society, he would be very much flattered to be chosen a Member thereof, and that he will accept that title with acknowledgement and pleasure." It is almost unnecessary to add, that his Majesty, who had always shown a great regard for science, was elected; indeed, a special Meeting was convened for the purpose[29].

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[27] Journal-book, Vol. XXVI. p. 309.

[28] The admission fee in both cases was, at the same time, raised from 3*l.* 3*s.* to 5*l.* 5*s.*

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[29] Journal-book, Vol. xxvii. p. 117. The minutes add: "His Majesty was elected unanimously in a very full Meeting; and some time after, signed the obligation in the Charter-book at the British Museum."

CHAPTER III.

Memoir of Sir James Burrow—Grosley's Account of the Society—James West chosen President—Memoir of him—Dr. Smith leaves a Legacy to the Society—Piece of Plate presented by the Society to Mr. West—Income of Society increases—Scientific Communications from Dr. Priestley—His Letters to Mr. Canton—Expedition of Discovery under Captain Cook—Society furnish Instructions for the Expedition—Letter from Dr. Priestley—Death of Mr. West—Sir James Burrow chosen President until the Anniversary—Election of Sir John Pringle—Memoir of him—Address of thanks to the King—Copley Medal awarded to Priestley—Address of Sir John Pringle—Proposition to award Medal to Priestley in 1767—Letter from Dr. Franklin—Hon. Daines Barrington proposes expedition to the North Pole—Letter from the Council to Lord Sandwich—Admiralty determine on fitting out an Expedition—Instructions prepared by the Society—Failure of the Expedition—Memorial to the Admiralty, recommending a second Expedition—Captain Cook sails as Commander—His Death—Daily Meteorological Observations commenced—Continued for seventy years—Transferred to Greenwich—Experiments to ascertain the Density of the Earth—Letter from Maskelyne—Result of the Experiments—Copley Medal awarded to Maskelyne—Scientific Labours of the Society—Exchange of Natural-history Specimens with the King of Spain.

1770—1775.

BUT little appears to be recorded of JAMES BURROW, Esq., beyond his having been an eminent lawyer, and Master of the Crown Office. He was twice elected President by the Council, to serve until the ensuing Anniversaries. In 1773 the Society had occasion to address the King, when he received the honour of knighthood. Sir James published four volumes of *Reports*, and one of *Decisions in the Court of King's Bench*. He also published an Essay on Punctuation, entitled, *De usu et ratione interpungendi*, the preface to which is written in a modest style, and concludes:—"I am so far from presuming to dictate to others, that I shall be very thankful for correction from better judges."

He was the author of *Some Anecdotes of Oliver Cromwell and Family; The Question concerning Literary Property*, a lucid and valuable pamphlet, written at the request of his friends; and he contributed five Papers to the *Philosophical Transactions*, "On Earthquakes," the phenomena of which he had attentively studied.

His tomb in Lingfield church, Surrey, bears the following inscription:—

> "Underneath lie the remains of Sir James Burrow, of Starborough Castle, of this Parish, many years Fellow, and above 30 years Vice-President, and on two occasions President, of the Royal Society; Master of the Crown Office, and Senior Bencher of the Inner Temple. Few, or none perhaps, have passed through life better contented with their lot, or have enjoyed it with more satisfaction or thankfulness: the convivial character was what he chiefly affected, and it was his constant wish to be easy and cheerful himself, and to see others in a like disposition. He was born 2nd Nov., 1701, O. S. Died 5th Nov., 1782."

A portrait of Sir James Burrow, painted by Vanloo, is suspended in the Meeting-room.

In the absence of any remarkable circumstances during the very short period that Sir James Burrow occupied the chair, we may avail ourselves of the following interesting extract, descriptive of the Society at this period, taken from a curious work entitled simply, *Londres*, in which the author (J. P. Grosley) gives an account of the various institutions and objects of interest which he saw in our metropolis. The work is in three volumes, and was published at Lausanne, in 1770. After giving a sketch of the foundation of the Society, the author thus proceeds:

"*Les instituteurs de cette Société firent tout pour l'honneur, et rien pour la fortune de ses membres, qui, encore aujourd'hui, fournissent par tête à toutes ses dépenses, soit courantes, soit extraordinaires. Ils paient même un droit de bien-venue ; j'ai vu un* gentleman *compter et remettre* 40 *guinées au secrétaire de la Société, qui les porta sur son livre : on me dit que c'étoit le droit de bien-venue. Chacun des membres nationaux contribue annuellement de* 3 *ou* 4 *guinées ; et au premier besoin extraordinaire, les guinées pleuvent de la part des plus riches associés, au* pro-ratâ *du besoin.*

"*Sur ces fonds extraordinaires, la Société a formé un cabinet d'histoire naturelle, après avoir élevé et disposé un batiment pour le recevoir. Elle a un garde pour ce cabinet et un bibliothécaire pour une bibliothèque, qui s'accroit tous les jours. Elle tient une correspondance très étendue, et fort coûteuse ; enfin elle dépense beaucoup en expériences, soit pour parvenir à de nouvelles découvertes, soit pour vérifier les anciennes.*

"*La formation de son cabinet n'est pas son plus grand objet de dépense. Les morceaux les plus rares sont, pour la plus grande partie, des présens qui lui viennent de toute l'Angleterre : le meilleur usage qu'un Anglois croit faire d'un morceau rare, singulier, curieux, que le hasard lui auroit procuré, ou qu'il aura très-chèrement acheté, c'est de le donner à la nation et au public, en le placant dans ce dépôt.*

"*La Société Royale réunit les objets que l'Académie des Sciences de Paris, et celle des Inscriptions ont partagés, c'est a dire, les hautes sciences, et les belles lettres. Tout homme, de tout état, soit Anglois, soit étranger, qui a fait quelque observation qu'il croit digne d'occuper, ou d'interesser la Société, est admis à la proposer, soit de bouche soit par mémoire. Je vis une fois un menuiser dans les* *habits de son état, annoncer à la Société assemblée la découverte d'un moyen qu'il avoit imaginé pour expliquer la cause du flux et reflux de la mer. Il parla assez long-temps, ne sachant ni ce qu'il disoit, ni ce qu'il voulait dire. Cependant il fut écouté avec la plus grande attention, remercié de sa confiance dans les lumières de la Société, prié de mettre ou faire mettre ses idées par écrit, et reconduit à la porte de la salle par un des principaux membres de la Société.*

"*Le lieu où elle s'assemble n'a ni grandeur ni magnificence; c'est une salle longue, basse, et étroite, qui n'a de meubles qu'une table couverte d'un tapis verd, quelques siéges de maroquin, et des bancs de bois, élevées par gradins, et qui remplissent la salle, en la traversant dans sa largeur. La table, placée devant la cheminée du fond, est entourée par le Président adossé au feu, et par les secrétaires. Sur cette table est couchée une grande masse d'argent doré, pareille à celle de la chambre des Communes, et que, comme celle de cette chambre, on accroche aux jambes de la table, lorsque la Société se forme en comité. Le Président est précédé en entrant et en sortant par l'huissier de la Société portant cette masse. Il a sous la main, au bureau, un petit maillet de bois, dont il frappe la table pour imposer silence, quand l'occasion le requiert, ce qui arrive très rarement. A l'exception du Président et des secrétaires, chacun se place au hasard, en évitant avec le plus grand soin, de causer de dérangement et du bruit. La Société existe spécialement dans un comité composé de* 20 *personnes, choisies parmi les associés qui peuvent le plus librement se livrer à leur gout pour ses exercises. Le Président et les secrétaires font toujours partie de ce comité, qui se renouvelle chaque année. Cet arrangement est d'autant plus nécessaire, qu'en* 1765, *la Société comptait près de* 400 *membres nationaux, et dans ce nombre, plus de* 40 *pairs du royaume, dont* 5 *du comité honoroient les assemblées de la plus grande assiduité.*

"*La classe des associés étrangers, au nombre d'environ* 150, *rassemble tous les savans de l'Europe, les plus connus, ou qui désirant l'être, ne peuvent se trouver en meilleure compagnie. Dans cette classe, aux noms des d'Alembert, Bernouilli, Bonnet, Buffon, Euler, Jussieu, Linné, Mairan, la Nauze, de Ulloa, Swieten, Voltaire, &c. sont melées par ordre alphabétique, les noms des ducs de Bragance, de Noia &c.; et des Princes et Ministres que plusieurs souverains de l'Europe honorent de la plus intime confiance*[1]."

This is a long extract, but valuable, as giving a graphic and, in all probability, faithful picture of the Society, at the time in which M. Grosley wrote.

At the Anniversary in 1768, Mr Burrow, who, as has been said, was only elected temporarily, retired, and James West, Esq. was chosen President.

James West was a son of Richard West, Esq., of Alscott, in the county of Warwick, said to be descended from Leonard, a younger son of Thomas West, Lord Delawar, who died in 1525. Being one of those more to be remembered for their position and patronage of science than for actual research, the leading events of his life occupy but a few lines. He was educated and took the degree of M.A. at Balliol College, Oxford—sat in Parliament, in 1741, for St. Alban's, and being appointed joint Secretary to the Treasury, retained the post until 1762, after which, in 1765, the Duke of Newcastle obtained for him a pension of 2000*l.* a-year. He was elected a Fellow of the Royal Society in 1726, and held the office of Treasurer from 1736 to 1768, a period of 32 years; his name occurs also in the concurrent lists of the Society of Antiquaries. Mr. West accumulated a very large collection of manuscripts, books, drawings, engravings, coins and medals. On his decease, the manuscripts were purchased by the Earl of Shelburne, the remainder being sold by auction; the sale occupied thirty-one days. His wife was the daughter and heiress of Sir Thomas Stephens. He died in July, 1772, leaving a son and two daughters.

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[1] Vol. II. pp. 239—243.

Astronomy is indebted to Mr. West for the preservation of several manuscript volumes and papers of Flamsteed's, pronounced by the late Mr. Baily to be of "inestimable value in an astronomical point of view."

It appears that he was aware of the existence of these documents, which were left at Islington, in a state of great disorder. Under the date of November 29, 1771, the Council-minutes record: "The President, James West, Esq., mentioned that he had acquainted the Commissioners of Longitude with the large collection of manuscript volumes and papers of the late Mr. Flamsteed, mentioned by Mr. Raper, and lately found at Islington by Mr. Belchier, and brought to the house of the Royal Society, and that the Commissioners had ordered their Secretary to pay 100*l*., being the price for the whole. And that the said volumes and papers be examined by the Astronomer-Royal and Mr. Robertson, to select such as related to the Royal Society, to be kept in their house; and the rest to be deposited in the Royal Observatory, for the benefit of Astronomy and Navigation." These papers form a considerable portion of Mr. Baily's *Account of the Rev. John Flamsteed,* printed at the expense of Government.

In February, 1769, the Society received a small legacy from Dr. Smith, of Cambridge. It was bequeathed in these words: "And as a testimony of my respect to the Royal Society of London for the promotion of Naturall Knowledge, I give them one hundred pounds[2]." Small as was the amount of this bequest, the manner in which it was conveyed, must have been gratifying to the Society.

In this year, James West, Esq., who, previously to his being elected President, had acted as Treasurer for the long period before mentioned, was presented with a piece of plate, consisting of a basin and ewer of the weight of 78 ounces, with the Arms of the Society engraved on them, and bearing the following inscription, *Soc. Regal. Londini Jacobo West Arm. ob Quæsturam bene et fideliter gestam.* The testimonial was well deserved, for Mr. West was untiring in his efforts to maintain the finances of the Society in a prosperous condition. At the time of his election to the office of Treasurer (1736), the average annual income of the Society was 760*l.*, but at the period of his resignation, it had increased to 1450*l.*

In 1770 the Society received several valuable Papers from Dr. Priestley. In a letter from Doctor Priestley to Canton, hitherto inedited, and for which, with some others from the Doctor, I am indebted to Mr. Edwin Canton through Professor Wheatstone, Priestley makes various interesting allusions to his philosophical labours. He writes :—

"Dear Sir, "*Leeds, February* 28, 1770.

"I sent you by the coach yesterday, a Paper containing *Experiments and Observations on Charcoal,* to be laid before the Royal Society by Dr. Watson; but I would have you, and Dr. Price, and Dr. Franklin, see it first. Let it, however, be presented the first opportunity, that it may be read while I am in London. I must now shut up my experiments till my return from London, and sit down to the recomposition of the MS. that was consumed at Mr. Johnson's. I have materials for a good part of another Paper on Air, but the processes in this course of experiments are often very slow, so that it may be some years before I complete them, and Philosophy is now only an occasional object with me, though I do think to undertake the History of Experimental Philosophy, and I keep your two books with that view. I am indeed ashamed to have kept them so long, but have a little more patience with me, and I will set to them in good earnest.

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[2] Journal-book, Vol. xxvii. p. 117.

"I have given orders to cancel the paragraph at the conclusion of the Preface to my *Perspective,* according to your advice received this day from Dr. Price, and I have inserted a recommendation of Mr. Nairne's composition[3] (as he calls it). Tell him that I think it is fair that he should be at the expense of the alteration. If he sell half as many of his cubes, as I shall copies of my work, he will get much more than I shall. However, he is very welcome to what I have done.

"I wish you would desire Mr. Johnson to get impressions of the two plates, of which he sent me prints, for 300 books of *Perspective,* which I shall send to London in a few days. The books will be unbound, and guards will be left to paste them at the end. They should be printed off immediately, that they may be dry and ready to put into the books as soon as they arrive.

"I shall be at a loss for a lodging in London. Could you be thinking of a place for me? I intend taking the liberty of being Dr. Kippis's guest for a night or two, till I can dispose of myself. As my brother has some thoughts of selling *electrical machines* in London, I bid him send one to meet me there, and not knowing where to bid him send it, I took the liberty to bid him direct it to you. It shall not trouble your house long; Mr. Dollond, he says, has applied to him to sell machines for him, so that it will probably be soon ordered thither.

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[3] This relates to India-rubber, at that time a great novelty.

"I expect to set out on my journey on Monday next, to be with you on Wednesday. I shall meet you at the Royal Society.

"Having, I think, put your friendship to a pretty fair test, I shall now conclude with subscribing myself,

"Dear Sir,
"Your's sincerely,
"J. PRIESTLEY."

Though not so strictly bearing on the Society's history, the reader will probably be interested in another inedited letter from Priestley to Canton, throwing some light on the Doctor's literary habits.

"MY DEAR SIR, "*Leeds, November* 18, 1771.

"YOUR letter, which I have this moment received, enclosed in one from Mr. Johnson, gives me great concern, especially as I have given just the same attention to every article. But, to prevent mistakes, my general custom is to make my amanuensis pronounce all the figures as he writes them; or to look over him myself, and all tables are printed directly from the originals, which I carry to the printer, unless they be abridged; and then I have never failed to have them read and compared with the original. Besides myself, a very intelligent clergyman always corrects the press, and I have two persons in the country, besides you in the City, to look at the sheets after they are printed off.

You may depend upon it that the mistakes shall be effectually rectified.

"I have this day corrected for the press as far as p. 704, and shall send you to this place some time this week; but I shall dread opening your letters after they have gone through your hands. However, find all the faults you can; I had rather see them now than afterwards.

"I very much question whether I shall proceed any further with this work. Most of the subscriptions are now come in, and they will not even purchase the books I have bought for the purpose; and I had better drop it at once, than not go on with proper spirit. If I could afford to do it, I should not mind the money, but I ought in common prudence to make something of my time if possible. If I do work for nothing, it shall be on theological subjects.

"I defer drawing up my papers for the Royal Society, because I keep getting farther light into the subject I am upon. I can pretty well account for the doubts I mentioned to Dr. Price, but some of my experiments can hardly be repeated until the next summer.

"I am, dear Sir,
"Your's sincerely,
"*To Mr. Canton.*" "J. PRIESTLEY.

In 1771, the Council were actively engaged in drawing up instructions for the use of the different officers appointed to the expedition of discovery, under Captain Cook. This expedition, the principal object of which was the exploring of high southern latitudes, with the view of determining the existence of a great antarctic continent then supposed to exist[4], was strongly recommended to Government by the Society, and in December, 1771, the Council were officially informed of the Admiralty's intention to send out an expedition, and requested to draw up such instructions and directions as they thought proper. These were carefully prepared and sent to the Admiralty, at the head of which was Lord Sandwich[5]. Two vessels, the *Resolution* of 462 tons, and the *Adventure* of 336 tons, were purchased from a shipbuilder at Hull, who had built the *Endeavour*, in which Cook made his first voyage; and having been equipped in the most liberal manner[6], they were ready for proceeding to sea in July, 1772. The Astronomical Instruments were of the best description; and among them were two chronometers, by Arnold, of the most approved construction, the property of the Society[7]. As soon as the expedition had been determined on, Sir Joseph Banks again applied for, and obtained permission from the Admiralty to accompany it. He accordingly made most extensive preparations, engaged Zoffany the artist, and three other draughtsmen, besides two secretaries and nine servants, and purchased all the stores necessary for his party. It appears, however, that these proceedings were disapproved by the Comptroller, Sir

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[4] Dalrymple's *Historical Collection of Voyages to the Pacific*

Ocean, published in 1770 and 71, had great influence in drawing the attention of the public to the idea of a southern continent.

[5] They are inserted in the 6th volume of Council-minutes, p. 125.

[6] It is curious to read, in Captain Cook's introduction to his account of this voyage, that it was proposed in the first instance to sheath the ships with copper, but the plan was abandoned, as liable to several objections.

[7] These chronometers are still in the Society's possession.

Hugh Palliser, to whom Lord Brougham applied the line:

> "He hated learning worse than toad or asp[8];"

and, after several ineffectual efforts to adjust differences, Sir Joseph Banks' patience was fairly exhausted, and he was obliged to abandon an enterprise alike honourable to himself, and useful in its prospective results to science. But a darker shadow remains upon the history of this expedition. This is the rejection of Priestley as astronomer, on account of his religious opinions. Sir Joseph Banks had invited the Doctor to join the expedition, proposing advantageous terms, including a provision for his family. Priestley consented to go, but was objected to by certain members of the Board of Longitude, and consequently lost the appointment. The following letter to Sir Joseph Banks, shows the feelings of the philosopher on this occasion:—

"Dear Sir, "*Leeds, Dec.* 10, 1771.

"After the letter which I received about a fortnight ago from Mr. Eden, who informed me that he wrote at your request, I cannot help saying that your's, and his, which I have now received, appear a little extraordinary. In the former letter, there was far from being the most distant hint of any objection to me, provided I would consent to accompany you. You now tell me that, as the different Professors of Oxford and Cambridge will have the naming of the person, and they are all clergymen, they may possibly have some scruples on the head of religion; and that on this account you do not think you could get me nominated at any rate, much less on the terms that were first mentioned to me.

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[8] *Lives of Men of Science*, Vol. II. p. 361.

Now what I am, and what they are, with respect to religion, might easily have been known before the thing was proposed to me at all. Besides, I thought that this had been a business of philosophy, and not of divinity. If, however, this be the case, I shall hold the Board of Longitude in extreme contempt, and make no scruple of speaking of them accordingly, taking it for granted that you have just ground for your suspicions. I most sincerely wish you a happy voyage, as I doubt not it will be greatly to the emolument of science; but I am surprised that the persons who have the chief influence in this expedition, having (according to your representation) minds so despicably illiberal, should give any countenance to so noble an undertaking. I am truly sorry that a person of your disposition should be subject to a choice restricted by such narrow considerations.

"I am, &c.

"J. PRIESTLEY."

The expedition sailed on the 13th of July, 1772, and, after an absence of 3 years and 18 days, returned to Plymouth, having circumnavigated the globe, and during the whole period lost only four men, of whom one only was by sickness. The reception of Cook was in all respects suited to his great merit. He was immediately raised to the rank of Post Captain, elected a Fellow of the Royal Society[9], and was honoured by having the Copley Medal awarded to him in 1776, for his Paper, giving an account of the method he had taken to preserve the health of his crew.

On this occasion, Sir John Pringle, in his discourse, said: "I now deliver this Medal, with the unperishing name of Cook engraven upon it, into the hands of one who will be happy to receive that trust, and to know that this respectable body never more cordially, nor more meritoriously bestowed that faithful symbol of their esteem and affection. For if Rome decreed the CIVIC CROWN to him who saved the life of a single citizen, what wreaths are due to that man, who, having himself saved many, perpetuates in your *Transactions* the means by which Britain may now, on the most distant voyages, preserve numbers of her intrepid sons, her mariners; who, braving every danger, have so liberally contributed to the fame, to the opulence, and to the maritime empire of their country[10]!"

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[9] He was elected on the 29th Feb., 1776, his certificate is signed by no less than 26 Fellows, including the names of Banks, Cavendish, Maskelyne, Blagden, Hunter, &c.

We must now return to the 2nd July, 1772, when James West died: a special Council was immediately summoned for the election of a President, when "it was moved and seconded that James Burrow, Esq., (formerly President) be now elected President of the Royal Society, which being put to the ballot, was found to be unanimous, and declared accordingly, and Mr. Burrow being informed thereof, and requested to attend the Council, took the oath of office, and also the oaths of allegiance, supremacy, and abjuration." Mr. Burrow only retained office until the Anniversary in the same year, when he resigned it, and Sir John Pringle was elected in his place.

Sir John Pringle was born in the county of Roxburgh, on the 10th of April, 1707. His father was Sir John Pringle, of Stickel, Bart., and his mother, Magdalen Eliott, was sister to Sir Gilbert Eliott, of Stobs, Bart. He was the youngest of several sons. After receiving a grammatical education at home from a private tutor, he was sent to the University of St. Andrew's, where he completed his education. In 1727, he went to Edinburgh to study medicine, but the superior attractions of Leyden,—then the most celebrated medical school in Europe,—at which the eminent Boerhaave lectured, induced him to leave the Scottish metropolis for the Dutch University at the end of a year. At Leyden he studied with great diligence, and took his degree of Doctor of Physic in 1730. Returning to Scotland, he settled as a physician in Edinburgh, and in 1734 was appointed Professor of Moral Philosophy, by the Corporation of the city. He remained in Edinburgh until 1742, when he was appointed physician to the Earl of Stair, who then commanded the British Army. By the interest of this nobleman, he was made physician to the military hospital in Flanders. In this position, Dr. Pringle saw a great deal of practice, and was not unfrequently in situations of extreme danger. It is related of him, that at the battle of Dettingen, he was in a coach with Lord Carteret, during the whole time of the engagement. Owing to a sudden movement they were for some time placed between the fire of their own troops and that of the enemy. The Doctor continued with the army in Flanders until 1745, having been promoted to the office of physician to the royal hospitals in that country, and was then sent home to attend the forces ordered to march against the Pretender's adherents in Scotland. It was in this year that he was elected a Fellow of the Royal Society. He remained with the Duke of Cumberland and the army after the battle of Culloden, till their return to England in August, 1746. In 1747 and 1748, he again attended the army abroad; and in the autumn of the latter year, he embarked with the troops for England, upon the conclusion of the treaty of Aix-la-Chapelle. He now resolved on settling in London, trusting to his skill and reputation for success, nor was he disappointed. In 1749, he was appointed Physician in Ordinary to the Duke of Cumberland. In subsequent years he published several medical works, the most celebrated of which was that *On the Diseases of the Army*, and read various Papers before the Royal Society, all of which acquired him considerable credit, both at home and abroad[11].

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[10] Sir John Pringle's discourse was thought of such importance, that the Board of Longitude requested to be allowed to insert it as an Appendix to Captain Cook's *Account of the Voyage*, and here it is accordingly printed.

In 1753 Dr. Pringle was elected into the Council of the Society, in which he continued to act for several years. In 1761 he was appointed Physician to the Queen's household, and in 1763 Physician Extraordinary to her Majesty. On the death of Dr. Wollaston in the following year, he succeeded him in the appointment of Physician in Ordinary to her Majesty; and on the 5th June, 1766, George III. created him a Baronet. Upon the death of James West, he was brought forward as candidate for the high honour of filling the chair of the Royal Society, and though his competitor was Sir James Porter, he was elected by a very considerable majority. This he always regarded as the highest honour that he had received, and being fully sensible of the importance and dignity of his new situation, he resolved to discharge its duties with all the attention, assiduity, and zeal, of which he was capable. Although Martin Folkes, and some of his successors, had been in the habit of delivering a complimentary address upon the award of the Copley Medal, at the same time entering into the history of that part of philosophy to which the subject of the award related, yet these discourses had never been printed before Sir John Pringle was raised to the chair. Dr. Kippis says, "The first speech that was made by him being much more elaborate and extended than usual, the publication of it was desired; and with this request it is said that he was the more ready to comply, as an absurd account of what he had delivered had appeared in a newspaper[12]." He continued these discourses at each Anniversary during the time that he occupied the chair. In 1774 he was appointed Physician Extraordinary to George III. In 1776 he became a member of the Academy of Sciences at Madrid, the Society for the promotion of Agriculture at Amsterdam, the Academy of Medical Correspondence at Paris, and the Imperial Academy of Sciences at St. Petersburg, which last honour was announced to him in the annexed interesting letter from Euler:

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[11] The celebrated and eminent Van Haller calls Dr. Pringle, *Vir illustris—de omnibus bonis artibus benè meritus.*

"MONSIEUR, "*Pétérsbourg*, 10 *Janvier*, 1777.

"*L'Académie Impériale des Sciences vient de vous recevoir au nombre de ses associés étrangers; elle a voulu vous donner par là, Monsieur, un temoignage public du grand cas qu'elle fait depuis long tems de vos travaux, et que vous meritez à tant de titres. Mais ce qui rélève encore d'avantage*

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[12] "On the different kinds of Air," when the Medal was awarded to Priestley.

cette reception, et ce qui est une distinction trop marquée pour ne pas vous en faire l'observation, c'est que votre agrégation a été proclamée le jour de l'assemblée solemnelle par laquelle l'Académie a célébré son premier jubilé demi-seculaire, jour qu'elle mettra toujours au nombre des plus glorieux pour elle par l'insigne faveur de sa Majesté le Roi de Prusse, et de son Altesse Impérial le Grand Duc, qui ont bien voulu consentir, qu'on les agrégeat à cette compagnie.

"*Je m'applaudis d'être dans ce moment chargé de vous annoncer, Monsieur, cette nouvelle ; et je saisis avec empressement, une occasion aussi favorable de vous exprimer les sentimens de la plus parfaite considération avec les quels j'ai l'honneur d'être, Monsieur,*

"*Votre, &c.,*

"JEAN ALBERT EULER."

In 1778 Sir John succeeded Linnæus as Foreign Member of the Academy of Sciences at Paris, an honour the more valuable, as being restricted to eight individuals. How highly he was esteemed by the Academy, best appears by the following extract from his *éloge*, delivered by Condorcet :—

"*Toute la conduite de M. Pringle annoncoit une de ces ames formées pour l'exercice des vertus douces et paisibles ; la première partie de sa vie avoit été employée dans les hôpitaux militaires, à prodiguer les consolations et les soins de l'humanité, plus encore que les secours de la médecine, aux infortunés qui les habitoient ; il consacra plusieurs années à donner des moyens de prévenir les maux dont le spectacle cruel lui avoit fait une impression profonde, le reste de sa vie fut partagé entre le soin de sa profession, l'étude et l'amitié.*

"*Il avoit embrassé à la fois presque toutes les sciences physiques, la philosophie spéculative, l'érudition, la théologie même : il aimoit à rassembler autour de lui les savans d'Angleterre les* *plus célébres, les étrangers, tous ceux en un mot de qu'il espéroit apprendre quelque chose, ou qui pouvoient profiter de ses lumières ; on retrouvoit dans ses discours, dans ses procédés, cette candeur qu'il avoit montrée dans ses ouvrages, et dans ses opinions ; l'amour de la vérité, le plaisir de faire le bien, étoient ses deux passions les plus chères, et même les seules qu'il ait jamais connues*[13]."

Declining health, accelerated by a severe fall, led him, in 1777, to entertain thoughts of resigning. It has been said, that he was further actuated to take this step, from being much concerned and annoyed by the disputes which arose in the Society, on the respective merits of pointed and blunt electrical conductors. On this subject Dr. Hutton says, "Considering the great attention that was paid by Sir John Pringle to the various and important duties of his office, and the great pains he took in the preparation of his discourses, it was natural to expect that the burthen of his honourable station should grow heavy upon him in the course of time. This burthen, though not increased by any great addition to his life, for he was only six years President, was somewhat augmented by a fall, from which he received some hurt. From these circumstances some persons have affected to account for his resigning the chair. But Sir John Pringle was naturally of a strong and robust frame and constitution, and had a fair prospect of being well able to discharge the duties of his situation for many years to come, had not his spirits been broken by the most cruel harassings and baitings in his office. His resolution to quit the chair originated from the disputes introduced into the Society concerning the question, whether pointed or blunt electrical conductors were the more efficacious, and from the cruel circumstances attending those disputes. These drove him from the chair[14]."

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[13] *Hist. de l'Acad.*, 1782, p. 66.

Dr. Kippis, however, who was one of Sir John Pringle's intimate friends, declares, "that he never heard him connect the latter circumstances with his resignation, which took place in opposition to the most earnest solicitations of his friends to continue in the chair."

At the Aniversary in 1778 he retired, and though no longer President, he continued to manifest the greatest interest in the Society's welfare, frequently attending the Meetings, and receiving the Fellows at his house in Pall Mall, until 1781, when he removed to Edinburgh. The lapse of many years had effected so many changes in that city, that it was no longer to him what it had been in early life. He returned, in consequence, to London, where he continued to reside until his death, which occurred on the 18th January, 1782. He was buried in St. James's Church, with considerable pomp, and was attended to the grave by a great number of his friends. A monument, by Nollekens, was sometime afterwards erected in Westminster Abbey, at the expense of his nephew.

The circle of Sir John Pringle's correspondents was very extensive, including all the principal men of science in Europe, to whom he was most hospitable during their visits to the metropolis; but the extent and interest of his epistolary correspondence can only be imperfectly judged of, owing to his having ordered the whole of his letters to be destroyed, a short time before his decease.

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[14] *Mathematical Dictionary.*

Sir John Pringle married, in 1752, the second daughter of Dr. Oliver, of Bath, but in default of issue, his property descended to his nephew and heir, Sir James Pringle, of Stickel, Bart. A fine portrait of Sir John, by Reynolds, hangs in the Meeting-room of the Society.

Shortly after the election of Sir John Pringle, the Council, headed by their President, waited on the King with the subjoined Address:—

"We your Majesty's dutiful and loyal subjects, the President and Council of the Royal Society, beg leave to approach your Royal person, and in the name of that body, humbly to express our most grateful acknowledgements to your Majesty, for the repeated marks of your Royal favour: in particular for your Majesty's ample benefaction, and for the assistance of your Majesty's ships, whereby we have been enabled to make observations of various kinds in the remotest parts of the globe, which could not have been effected by the funds of the Society.

"Impressed with the deepest sense of their duty, and animated with the favour of their most gracious Patron, the members of the Royal Society will continue ardently to pursue the great end of their institution, the improvement of natural knowledge for the honour of their country, and for the benefit of mankind.

"John Pringle,
President R. S."

The King, it is stated, received the deputation most graciously, and His Majesty conferred the distinction of knighthood on James Burrow, the late President.

At the Anniversary in 1773[15], the Copley Medal was awarded to Priestley, for his "Experiments on different kinds of Air," communicated by him to the Society, and printed in the *Philosophical Transactions.*

On this occasion, Sir John Pringle delivered a discourse, "On the different kinds of Air," at the conclusion of which he thus addressed Dr. Priestley:—

"In the name and by the authority of the Royal Society of London, instituted for the improvement of Natural Knowledge, I present you with this Medal, the palm and laurel of this community, as a faithful and unfading testimonial of their regard, and of the just sense they have of your merit, and of the persevering industry with which you have promoted the views, and thereby the honour, of the Society. And in their behalf, I must earnestly request you to continue those liberal and valuable inquiries, whether by further prosecuting this subject, probably not yet exhausted, or by investigating the nature of some other of the subtile fluids of the universe.

"You will remember that Fire, the great instrument of the chemists, is but little known even to themselves; and that it remains a query, what was by the most celebrated of philosophers proposed as such, whether there be not a certain fluid (he calls it Æther), the cause of gravity, the cause of the various attractions, and of the animal and vital motions[16]. These, Sir, are indeed large demands; but the Royal Society have hitherto been fortunate in their pneumatic researches. And, were it otherwise, they have much to hope from men of your talents and application, and whose past labours have been crowned with so much success[17]."

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[15] The Journal-book states, that the Medal adjudged to Priestley, was for the year 1772. It was however given in 1773.

[16] Newton's *Optics*, Quer. 18—24.

It may appear singular, that a philosopher who had done so much for science, and whose communications shed such lustre on the Royal Society, should have been so tardily rewarded by the adjudication of the Copley Medal[18].

I am enabled however to show, that as early as 1767, it was proposed to award the Medal to Priestley, for his experiments in electricity. Why the proposition was not carried into effect will best appear by the following letter from Dr. Franklin, now published for the first time, and for which I am indebted to Mr. Wheatstone. It is addressed to Mr. Canton:—

"DEAR SIR, "*Friday, November* 27, (1767)[19].

"AFTER the Society was gone, my Lord Morton said (when I offered him the Paper), that it ought to have been delivered before, and read to the Society;

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[17] Journal-book, Vol. XXVIII. p. 230.

[18] As soon as Priestley had received the Medal, the French Academy elected him one of their eight Foreign Members. Cuvier in his *éloge* of Priestley says: "*La Société Royale lui décerna la médaille de Copley, que l'Angleterre considère comme le prix le plus noble auquel on puisse arriver dans les sciences. L'Académie de Paris lui accorda un prix non moins noble, l'une de ces huits places d'associés étrangers.*"

[19] The date of this year is not attached to the original letter. But I have ascertained, by reference to various documents, that it was written in the above year. The Council and Society met on the previous day, and at both Meetings Lord Morton and Dr. Franklin were present.

he, however, desired me to produce it to the Council. Then the reading of it was opposed, as not being referred to them by the Society. But this was at last got over, by Dr. Morton's proposing that the giving a Medal to Dr. Priestley should be taken into consideration, and that in order to judge the better of the propriety of that proposal, the Paper should be read. It was accordingly read. I was then desired, as the best judge present, to give my opinion of the merit of the experiments as to the Medal; which I did in plain terms, declaring it as my judgment, that the great pains and expense the Doctor had been at in making them, and the importance of the experiments themselves, well deserved that encouragement from the Society; and that it was a mark of distinction justly due to so much philosophical industry and sagacity.

"One that sat near me, told me he was surprised at the account I had given, as he had been assured the Medal was intended to be bestowed on the Doctor for writing a history, which was thought wrong, but it now appeared he had made many valuable new experiments, &c. Then a question arose, how far it was proper to give a Medal for experiments that had not been sent to the Society, till they were published; and this occasioned a search for Sir Godfrey Copley's Will, which could not be found; but an agreement was found, recorded between the Society and his executors, that the 5*l.* should be given for the best experiment within the year, proposed and directed to be made by the Society, and made in their presence. This not having been the practice of late years, it began to be whispered that most of the Medals had been irregularly given. A subsequent resolution was, however, found, to print the clause of Sir Godfrey Copley's Will in every number of the *Transactions,* for the encouragement of foreigners to endeavour obtaining the reward, as there was reason to fear a failure of experiments upon the former plan. By this time it grew late, and it was concluded that the books should be searched, to find all the steps that had been taken in disposing of this prize, whether in money or in medals, from the first instance in 1717 to the last; with the reasons and grounds on which the Council had proceeded, and that a copy of this part of Sir Godfrey Copley's Will should be obtained from the Commons; when, at the next Council, the matter might be reconsidered, and the Medal then given to Dr. Priestley, if the Council thought fit, and it should be found not contrary to the Will so to do. Thus the business ended for that time; and how it will conclude at last, seems an uncertainty, for I think some persons are busy in an opposition to the measure. But I hope it will end in favour of merit, in which case I think our friend cannot miss it. "I am, dear Sir,

"Your's, &c.

"B. Franklin."

In the American edition of Franklin's *Works*, is a letter written to Lord Morton, by Franklin, in which he says, "Dr. Priestley's electrical experiments are mostly quite new, and some I think very curious and important, well deserving for that reason, and for the great pains and expense he had been at in making them, the honor of the Society's Medal." These documents prove that Franklin, with the honesty and clear-sightedness which eminently characterised him, was fully convinced of Priestley's claim to the Medal several years before the award.

In 1773, the Hon. Daines Barrington presented a series of Papers to the Society, entitled, "Instances of Navigators who had reached high Northern Latitudes." These documents, although not read before the Society until the next year, were taken into immediate consideration by the Council[20]; they came to the resolution of applying to the Earl of Sandwich, (then First Lord of the Admiralty), to obtain his Majesty's sanction, for an expedition to be fitted out for the purpose of trying how far navigation might be practicable towards the North Pole. Lord Sandwich was thus addressed:—

"*Royal Society, Crane Court, Jan.* 19, 1773.

"My Lord,

"I am directed by the President and Council of the Royal Society to represent to your Lordship, that they have lately had under their consideration the probability of navigation being practicable nearer the North Pole, than has been generally imagined; and that there is room to hope, that a passage by or near the North Pole to the East Indies may be thereby found out. And as a voyage made towards the North Pole might be of service to the promotion of natural knowledge, the proper object of their institution, they cannot but be much interested in the prosecution of the same. They, therefore, beg leave to recommend it to your Lordship, who has always shown such readiness in promoting science and geographical knowledge, whether it might not be proper to take some steps towards the making such discovery.

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[20] These Papers, which are very interesting, are preserved in the Archives of the Royal Society. They are not printed in the *Transactions*, but were published in 1775, and again, with additional matter and appendix by Col. Beaufoy, F.R.S., in 1818. Mr. Barrington lays great stress upon the following passage. In 1662—3, Mr. Oldenburg, Sec. R.S., was ordered to register a Paper, entitled, "Several Enquiries concerning Greenland, answered by Mr. Gray, who had visited those parts. The 19th query was, How near any one hath been known to approach the Pole? *Answer.* I once met upon the coast of Greenland, a Hollander, that swore he had been but half a degree from the Pole, showing me his Journal, which was also attested by his mate; where *they had seen no ice or land, but all water.*" Boyle mentions a similar account, which he received from an old Greenland Master, on the 5th April, 1675. See Boyle's *Works*, Vol. II. p. 397.

"I am, &c.

"M. Maty, *Secretary.*"

It is gratifying to record that the wishes of the Council were immediately complied with. His Majesty directed that an expedition should be undertaken, "with every encouragement that could countenance such an enterprize, and every assistance that could contribute to its success." Sir John Barrow, in his *History of Voyages in the Arctic Regions*, states, that "two ships, the *Racehorse* and the *Carcass*, bombs, as being the strongest, were fixed upon, as being the most proper for the purpose; the former having on board a complement of ninety men, and the latter eighty, with an additional number of officers. The command of the expedition was given to the Hon. Captain Constantine John Phipps (afterwards Lord Mulgrave), who embarked in the *Racehorse*[21], and Captain Lutwidge was appointed to the command of the *Carcass.* Two masters of Greenland ships were employed as pilots. Mr. Lyons was recommended by the Board of Longitude as astronomer; and instruments of various kinds, of the best description at that time in use, were sent on this interesting voyage."

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[21] It is worthy of remark that Nelson, then in his 15th year, accompanied Captain Phipps in this expedition.

It appears by the Council-minutes[22], that the Rev. H. Horsley, Mr. Cavendish, Rev. N. Maskelyne, and Dr. Maty, drew up directions and instructions for the use of the observers, copies of which were ordered to be deposited in the Archives of the Society.

The ships sailed from the Nore on the 10th June, 1773, under the most favourable circumstances. On the 27th June they had reached the latitude of the south part of Spitzbergen "without an increase of cold, and without any appearance of ice, or sight of land. On the 5th July, when in the latitude of 79°·34′, they fell in with a body of ice, along which they stood, to ascertain whether it was connected with Spitzbergen or was so detached as to enable them to pass to the eastward. With great difficulty they pushed through small openings in the ice, and reached the latitude of 80°·48′ on the 27th July, when they were stopped by the main body of ice, which extended in a line nearly east and west. On the 30th July the weather was exceedingly fine and mild." "The scene," says Captain Phipps, "was beautiful and picturesque; the two ships becalmed in a large bay with three apparent openings between the islands that formed it, but everywhere surrounded with ice as far as we could see, with some streams of water; not a breath of air; the water perfectly smooth; the ice covered with snow, low and even, except a few broken pieces near the edges; the pools of water in the middle of the pieces were frozen over with young ice[23]."

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[22] Vol. VI. p. 304.

[23] Phipps, *Voyage towards the North Pole*, p. 60.

The ships were now beset with ice, and the pilots being much farther north than they had ever been before, became alarmed. Captain Phipps resolved on abandoning all attempts to attain a higher latitude, and after great difficulty succeeded, on the 11th of August, in getting the ships into open water, and finally reached England on the 25th September.

The failure of Captain Phipps did not damp the ardour of the Royal Society. Early in 1774, the Council-minutes show that another expedition to the Arctic Regions was frequently the subject of debate, which assumed a more decided form in the following Memorial, addressed to the Admiralty in February, 1774:—

"The Council of the Royal Society having last year submitted a proposal to your Lordships for making discoveries towards the North Pole (which was honoured with your approbation), are now emboldened to lay another plan before the Board of Admiralty, for the promotion of science in general, and more particularly that of geography. They conceive that a ship or ships fitted out either in Europe, or the East Indies, may be victualled at the port of Canton, in China; from whence the run to the northern parts of New Albion will not be probably longer than from England to Jamaica, such vessel, therefore, (even if no refreshment could be procured on the coast of North America) might proceed up the north-western side of that continent, so as to discover whether there is a passage into the European seas.

"They conceive also, that if no such communication can be found by this new attempt, that the coast of the north-eastern parts of Asia, Kamtchatska, and Korea, may be explored, with regard to which we are so imperfectly informed at present; and that the vessel may afterwards return in proper time to the port of Canton[24]."

In reply to this communication, the Council received a letter from the Admiralty, stating the inability of Government (on the ground of expense) to send out an expedition immediately; but that the subject would not be lost sight of. A short time after the receipt of this communication, the Hon. Daines Barrington, then on the Council, announced, that he had "a very full conversation with Lord Sandwich in relation to the voyage of discovery lately proposed by them to the Board of Admiralty, and found that notwithstanding his lordship's endeavours, it cannot take place during the present year, for the reasons assigned by the Admiralty, but that it will be undertaken after the return of Captain Cook, in 1775, when a similar expedition will be fitted out, which will, in general, follow the outline proposed by the Council of the Royal Society to the Board of Admiralty."

We may pause at this part of the Society's history to state, that in 1746 an Act of Parliament was passed, offering 20,000*l.* to the ships of any of his Majesty's subjects, or the commander, officers and seamen of such ships as belonged to his Majesty, who should find out and sail through any passage by sea between the Atlantic and Pacific oceans, in any direction or parallel of the northern hemisphere to the northward of the 52d degree of north latitude. This munificent reward, coupled with the glory of discovering the supposed passage, to which the naval energy of Great Britain has since been been so frequently directed, were great inducements for the Admiralty to lend a willing ear to the solicitations of the Society; and accordingly, shortly after Cook's return, they gave notice of their intention of fitting out an expedition. It was not, as appears, at first intended to offer the command to Captain Cook, who required rest after his arduous labours. But we are told by his biographer, Dr. Kippis, that "he was consulted upon everything relative to the business, and his advice was particularly requested with regard to the properest person for conducting the voyage. To determine this point the Captain, Sir Hugh Palliser, and Mr. Stephens, were invited to Lord Sandwich's to dinner. Here, besides taking into consideration what officer should be recommended to his Majesty for accomplishing the purpose in view, many things were said concerning the nature of the design. Its grandeur and dignity, the consequences of it to navigation and science, and the completion it would give to the whole system of discoveries, were enlarged upon in the course of the conversation. Captain Cook was so fired with the contemplation and representation of the object, that he started up and declared, that he himself would undertake the direction of the enterprize." Dr. Kippis adds, that this was exactly what was desired; and his testimony is entitled to greater weight, as he states that his authority was Lord Sandwich, from whom he received the information. It only remains to notice, that the Society had the pleasure of receiving a communication from the Admiralty, announcing that orders had been given to fit out an expedition; and it accordingly sailed from England on the 25th June, 1776. Nothing was left undone to render the equipment of the ships as complete as possible[25], and every thing gave promise of success. The fatal issue is well known. The gallant and intrepid Cook fell under the clubs of the natives of the island of Hawaii, a victim to his bravery, and their barbarity. This tragic event occurred on the 14th February, 1779; how deeply his death was felt by the Royal Society, will be seen hereafter.

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[24] It will be observed, that the peculiar feature in the recommendation of the Council was, reversing the plan of discovery generally followed; and instead of attempting to pass from the Atlantic to the Pacific, it was proposed to try the opposite course. This had been tried by Captain Cook, but he did not attain a higher latitude than 70°·45′.

The philosophy of Meteorology now attracted attention, and in November, 1773, the Council resolved that daily observations should be made at their house with the "barometer, thermometer, rain-gage, wind-gage, and hygrometer[26]." The manner of making the observations was placed under the superintendence of the Hon. Henry Cavendish. They were made at the hours of 8 A.M. and half-past 2 or 3 P.M.[27] and published annually in the *Philosophical Transactions* from 1774 to 1843, inclusive. At the close of the latter year they were discontinued. The following notice, in the *Philosophical Transactions* for 1844, will explain the reasons which led the Council to come to this determination. "The Government, on the recommendation of the President and Council, has established at the Royal Observatory, at Greenwich, under the superintendence of the Astronomer-Royal, a Magnetical and Meteorological Observatory, where observations are made on an extended scale, which are regularly published. These, which correspond with the grand scheme of observations now carrying out in different parts of the globe, supersede the necessity of a continuance of the Observations made at the apartments of the Royal Society, which could not be rendered so perfect as was desirable, on account of the imperfections of the locality, and the multiplied duties of the observer."

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[25] They were the *Resolution*, commanded by Cook, and the *Discovery*, commanded by Captain Clarke. Sir Joseph Banks contributed several presents to conciliate the natives.

[26] So styled in the *Transactions*. See Vol. LXVI., containing a Paper, by Mr. Cavendish, giving an account of the Royal Society's instruments, and the way in which they were used.

[27] Of late years the hours were 9 A.M. and 3 P.M.

We may add to this explanation, that the observations were not discontinued at the Royal Society, until a similar series had been established at Greenwich[28]; thus their continuity in the metropolis (for Greenwich may now truly be called part of this mighty city) is preserved unbroken. The readings of the barometers used at the Royal Observatory are considered coincident with the Standard Barometer of the Royal Society[29].

It was during the Presidency of Sir John Pringle, that the celebrated experiments were made to ascertain the density of the earth by observations of the attraction of a mountain upon a plumb-line. Newton had calculated the density of the earth from the general theory of gravitation; but from many circumstances his results were considered inaccurate. He was the first to suggest the desirableness of making experiments upon the attraction of a mountain; and when the French academicians were sent to measure a degree of the meridian in Peru, Bouguer endeavoured to determine the effect of the attraction of Chimborazo, which he found to be very much smaller than he anticipated[30]. His instruments were, however, of very imperfect construction. In 1772, Maskelyne read a Paper before the Royal Society, strongly urging the necessity of experiments of the above nature.

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[28] The Meteorological Observations made at present are very comprehensive; extracts of them are published weekly as an Appendix to the *Registrar-General's Mortality Returns*.

[29] The *Phil. Trans.* for 1837, contains a paper by Mr. Baily, descriptive of this instrument, which he says, "may justly be considered a *Standard Barometer*." It was made by Newman in 1837, under the superintendence of Mr. Baily, Professor Daniell, and Dr. Prout.

"It will," he says, "easily be acknowledged that to find a sensible attraction of any hill from undoubted experiment, would be a matter of no small curiosity; would greatly illustrate the theory of gravity, and would make the universal gravitation of matter, as it were, palpable to every person, and fit to convince those who will yield their assent to nothing but downright experiment. Nor would its uses end here; as it would serve to give us a better idea of the total mass of the earth, and the proportional density of the matter near the surface compared with the mean density of the whole earth. The result of such an uncommon experiment, which I should hope would prove successful, would doubtless do honour to the nation where it was made, and the Society which executed it. Sir I. Newton gives us the first hint of such an attempt in his popular treatise of the *System of the World*, where he remarks: That a mountain of an hemispherical figure, three miles high and six broad, will not, by its attraction, draw the plumb-line two minutes out of the perpendicular. It will appear, by a very easy calculation, that such a mountain would attract the plumb-line $1'\cdot18''$ from the perpendicular[31]."

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[30] Delambre's *Astronomie au dix-huitième siècle.* He says that Bouguer came to the conclusion, "*avec beaucoup de vraisemblance, que la montagne devait être creuse, mais il n'en pouvait mésurer les vides.*" See also, de Zach; *l'Attraction des Montagnes*, 8vo. 1814.

The writer concludes with the enumeration of certain hills in Yorkshire and Cumberland, which appeared to him to be suitable for the purpose.

The Council resolved on carrying Dr. Maskelyne's suggestion into effect. A "Committee of Attraction" was appointed[32], and Mr. Charles Mason was sent to examine the hills in the north of England, with the view of selecting one suitable for the experiment. The hills in England he found were not adapted for the purpose, and having extended his journey to Scotland, recommended a mountain in Perthshire, as combining the necessary requisites.

The Committee accordingly reported, that "having considered the accounts which have been laid before them of several mountains in different parts of Great Britain by Mr. Charles Mason, whom they employed to make the surveys necessary for their information, do agree that a mountain in Perthshire called Schehallien, or the Maiden's Paps, seems for its situation, size, and figure, to be a proper place for the intended experiments."

The Committee subsequently reported, "that it would add to the lustre and authenticity of the observations to be made in Scotland, if Mr. Maskelyne could be prevailed on to undertake the direction of them on the spot;" and the Council resolved upon requesting the Astronomer-Royal to superintend the experiments. Maskelyne, who was present as a Member of Council when this resolution was passed, at once signified his consent, but refused to accept any payment, upon which it was resolved, "that the thanks of the Council should be given to Mr. Maskelyne, and that all his travelling and extraordinary expenses should be defrayed by the Society."

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[31] *Phil. Trans.*, Vol. LXV. p. 496.

[32] The Committee consisted of the Hon. Daines Barrington, Hon. Henry Cavendish, Dr. Franklin, Dr. Horsley, Dr. Maskelyne, Mr. Raper and Dr. Watson; Sir Joseph Banks was afterwards added to it.

Maskelyne and his assistant, Mr. Burrow, left London in June, 1774, and arrived at the mountain on the last day of that month; and although the summer and autumn were extremely unfavourable, the observations and experiments were completed in November. The accompanying letter from Maskelyne to Dr. Lind, gives some account of their mode of proceeding[33]:—

"*From the Observatory on the south side of Schehallien, July* 18, 1774.

"DEAR SIR,

"I promised to write to you when I had got my instruments in order, and had weather for making observations. It is now but a week ago since I was first able to see a star in the Sector (so bad has the weather been), and I have yet had only one good day. This, however, has enabled me to adjust the Sector, and get it in the meridian; and I am now ready to begin making observations with it, whenever the weather will permit, which I have good hopes, as the clouds fly much higher than they did before, and I frequently see a good deal of blue sky. However, I hardly think I shall be able to finish my observations on this side, in less than a fortnight or three weeks. But this is quite a matter of uncertainty. After that, I must remove myself and instruments to the north side of the hill, and suppose it will take a fortnight to make that removal; I shall then endeavour to make the observations on the north side; and after all the astronomical work is finished, or rather during the removal of the instruments, shall measure the distance of the two stations of the Observatory in feet, by trigonometrical operations. At present, I am inclined to measure it by levelling directly across the hill, that is to say, up the south side, and down the north side. I shall be very glad to see you here, when it will be most agreeable to you; whether now, or at the measurement of the two stations. I have not heard when the Lord Privy Seal will come; he at first proposed not to come till I was settled on the north side, but I now hear that he is expected every day at Castle Menzies. Col. Roy has been here, and been at the top of the hill, and made many observations, both with his barometers and quadrant; which will assist in settling the height of many distant hills, as well as serve for trying the exactness of M. de Luc's rules.

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[33] This letter forms one of a Volume of MS. letters by Maskelyne, preserved in the Archives of the Society.

"I remain, &c.

"NEVIL MASKELYNE."

The result of the labours of the Astronomer-Royal was, that the mean sum of the attraction of the mountain on the north and south sides, was found to amount to 11″·6.[34] The next business was, to deduce the density of the earth from the data thus obtained. Dr. Hutton undertook this laborious task: and after a series of calculations, he published a very interesting Paper in the 68th volume of the *Transactions*, giving an account of the methods he pursued, and deducing as a conclusion the density of the earth as 4.481.[35] These experiments, conducted entirely at the expense of the Society, cost 597*l.* 16*s.*, including 150*l.* paid to Dr. Hutton for his trouble in making the calculations. Maskelyne was rewarded with the Copley Medal for his labours, on which occasion Sir John Pringle said: "In the execution of this interesting experiment, our worthy brother has not only exerted a patience and perseverance, but a sagacity and judgment, which must ever redound to his honour. All doubts about an universal attraction must at last be terminated, and every philosopher in that respect must now become a Newtonian." And addressing the Astronomer, he added: "The judgment, Sir, of the Council in awarding you the prize, having received the sanction of the Royal Society, I do, in the name and by the authority of that illustrious body, present you, their most worthy brother, with this sincere pledge of their affection; as the lasting token of their acknowledgement for your several ingenious and useful communications, and more particularly for this last painful and capital experiment, which adds no small lustre to their *Transactions*. You have, Sir, in charge the noblest branch of Natural Philosophy; such it has ever been held by this Society, and as such it ever has been cherished and cultivated by them. And they flatter themselves that their cares and solicitations have not been fruitless; since, from their first institution to this day, there have never been wanting some excellent men in that line, to promote the science, and do honour to this community."

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[34] See *Phil. Trans.*, Vol. LXV. Bouguer had made the attraction of Chimborazo only 8″.

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[35] Playfair's subsequent geological examination of Schehallien, has led to results differing from the foregoing. See his paper in the *Transactions* for 1811, where he gives the density of the earth = 4.866997. It is desirable to mention, that Dr. Hutton strongly recommended the repetition of the experiment, "with all the care and precision that it may be possible to give to it, till an uniformity of conclusions shall be found sufficient to establish the point in question beyond any reasonable possibility of doubt." The reader will find that Dr. Hutton's wishes were carried out, though in another form.

These elaborate experiments by Maskelyne, with those of Sir George Shuckburgh Evelyn, and General Roy, to establish correct formulæ for measuring heights by the barometer; and the labours of a Committee to determine the proper method of graduating thermometers, afford gratifying evidence of the activity of the Society during this period[36].

There is an interesting correspondence preserved in the Archives, between the Society and the Marquis Grimaldi, Secretary of State to the King of Spain, respecting an exchange of specimens in natural history, &c. A letter from the Marquis on the subject deserves a place here. It is addressed to Lord

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[36] Some curious and valuable information respecting the manufacture and use of philosophical instruments in London at this time, will be found in a work, entitled, *Collection de Différens Traités sur des Instrumens d'Astronomie, Physique, &c., par J. H. De Magellan, Gentil-homme Portugais, Membre de la Société Royale de Londres*, 4to. Paris, 1775. This Magellan was deputed by the Portuguese Government to purchase philosophical instruments in London. A great number invented by Fellows of the Royal Society are described and figured.

Grantham, who wrote to the Marquis on the part of the Society.

"My Lord, "*St. Ildefonso*, 28 *July*, 1774.

"I have laid before the King your Excellency's letter of the 13th inst., concerning the present of natural curiosities, which the Royal Society is desirous of making to His Majesty, and the exchange which that Society wishes to establish with the Royal Cabinet of Natural History now forming at Madrid. The King exceedingly esteems the proposed present of the Society, and has ordered, that as soon as the Cabinet at Madrid is arranged, and curious pieces begin to come in from his dominions, there shall be a correspondent return made to the Royal Society of such natural curiosities as shall appear most worthy of their attention, and that this kind of reciprocal traffic and exchange shall be kept up for the future.

"I am, &c.

"Grimaldi."

Soon after the receipt of this letter, some cases arrived containing various specimens for the Museum, and we are informed that two large boxes "full of curiosities," were despatched by the Society in return, directed to the Cabinet at Madrid.

CHAPTER IV.

Revision of Statutes—Institution of the Bakerian Lecture—Communications by John Hunter—Receives the Copley Medal—Dean and Chapter of St. Paul's request the Society to protect the Cathedral from Lightning—Government apply to the Society to affix Lightning Conductors to Powder Magazines—Committee appointed—Recommend Franklin's pointed Conductors—Mr. Wilson dissents—Controversy—George III. interferes—Quarrel assumes a political character—Sir John Pringle resigns—Receives the thanks of the Society—Sir Joseph Banks elected President—Memoir of him.

1775—1780.

DURING the years 1774, and 5, the Council were frequently occupied in revising the Statutes, with the view of rendering them more in accordance with the various changes in the constitution of the Society. The preface to the new edition sets forth the principal alterations :—

"It had been the usage, for upwards of the first sixty years, to nominate and approve in *Council* all Candidates for being Fellows, previously to their being proposed to the *Society* for election ; and they were enjoined to appear for admission within four weeks after their election. But, about the year 1727, objections having arisen to the short time of four weeks, some allowances were made to persons residing above forty miles from London ; and in the year 1730, the present mode of propounding for election, and fixing the certificate up for ten weeks in the Meeting-room, was settled. In 1753, it was enacted, that payment of the admission fee, and signing a bond for annual payments, were necessary to entitle a person to be publicly acknowledged a member; and in the years 1761, 1766, 1769 and 1770, several regulations were made concerning the recommendation and election of foreigners. These Associates are now limited to one hundred.

"In consequence of the *Philosophical Transactions* being supplied gratuitously to the Fellows, an advance of the admission and composition fees was judged reasonable. These, therefore, were increased; the first from *two* to *five* guineas; the second from *twenty* to *twenty-six* guineas.

"At first, when the Society were not in possession of much ready money, it was judged necessary that the Fellows should pay their weekly contributions once a quarter. The Treasurer was not to have more than 20 *l.* in his hands at a time: all surplus was to be locked up in the iron chest, there being then no public funds; now the moneys of the Society are laid out in government securities, a practice which has been in use for many years; and statutes are therefore enacted accordingly.

"The regulations concerning the publication of the *Transactions* have rendered it necessary to alter the chapter relating to the Secretaries, with regard to the papers read to the Society, and their publication.

"The ancient statutes concerning the Clerk were such as suited the Society at their first institution, and while they continued at Gresham College, when they had little or no concerns with rents, taxes, repairs, &c. And as every officer had but little business to do for the Society, besides what was done at the usual Meetings, few rules for them were found wanting, and a few for their Museum and Library; which, being in the galleries of that College, the resident Professors had an eye over those collections: but when the Society became possessed of a house of their own, fit for their Meetings and curiosities, it was found necessary to have a resident officer, who should have the care of the house, and of the necessary preparations for the Meetings, and also the care of the Library and Repository. Statutes are, therefore, now enacted for the governance of this officer.

"The articles of the Register and Letter-books are now omitted, because the continuation of those books has, many years ago, been found useless; other methods having been found to preserve the original papers not published, as well as those which are published, at a rate much less expensive[1].

"The office of Curator was at first thought so essential, that the Society allotted to it a salary more considerable than any one of the public Professors received at that time, besides the apartments they used to have in the Society's house at College. But, as the Society's revenues have not to this day been sufficient to enable them to assume the exterior splendor, which, by their Charter, it seems to have been imagined that they might in due time arrive at, the appointments of Curators with large allowances, and of Sergeant-at-mace, &c. have hitherto been declined. Besides, the experimental part of Philosophy having begun, even in the early years of the Society, to be cultivated, several gentlemen procured apparatuses to satisfy themselves in private; so that many years had not passed, before a considerable number of the Fellows were so well acquainted with the mode of making experiments, that such accomplished Curators have not been found necessary; and when experimental philosophy arrived at such high popular regard as to be frequently explained in public lectures, that kind of knowledge became more generally diffused. Several persons, indeed, have formerly been actually employed by the Society as Curators, particularly the *Doctors Hooke* and *Desaguliers.* But neither of them had ever above 50*l.* a year, and that not certain: it depended on the number of experiments which they had exhibited to the Society in the preceding year. The chapter of the Statutes relating to this office is, therefore, omitted in this edition.

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[1] They are kept in Guard-books, arranged in chronological order.

"In like manner, at the institution of the Society, the fabrication of instruments for experiments was not commonly known to workmen; and therefore some Statutes were made concerning *Operators,* or persons well acquainted with the use of tools in various works; who were at first judged necessary to attend the Meetings, to be ready to assist in any of the experiments to be made before the Society: but the *Experimental Philosophers* having long since taught and familiarized such general knowledge, in working on things formerly unknown, particular *Operators* to the Society have been for many years found useless; as the different artificers employed by them can now readily furnish whatsoever is wanted.

"So a *Printer* to the Society was an officer that appeared necessary at the time when the Statutes concerning that office were established: but the affairs of printing and bookselling are so greatly altered since the first institution of the Society, that printers and booksellers have for many years stood in no other relation to the Royal Society than any other tradesmen they employ; and particularly since the *Transactions* have been printed under their own care. They themselves now buy and pay for the paper; employ and pay the printers and engravers; correct and publish their own works; and finally dispose of to purchasers the surplus copies above the number distributed amongst their Members by their own Librarian[2]."

These constitute the principal changes made in the Statutes, a new edition of which was printed in 1776.

During the Presidency of Sir John Pringle, the Bakerian lecture was instituted. It originated in a bequest of 100*l.* from Henry Baker[3], Esq., F.R.S., to the President, Council, and Fellows of the Royal Society, the interest of which he directed to be applied "For an oration or discourse to be spoken or read yearly by some one of the Fellows of that Society, on such part of Natural History or Experimental Philosophy, at such time, and in such manner, as the President and Council of the said Society for the time being, shall please to order and appoint. On condition, nevertheless, that if any one year shall pass after the payment of the said one hundred pounds, without such oration or discourse having been read or spoken at some Meeting of the said Royal Society, the said one hundred pounds shall then become forfeited, and shall be repaid by the said Society to my executors, their executors, or administrators."

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[2] This custom no longer exists. Messrs. R. and J. E. Taylor, Printers to the Society, publish and sell the *Transactions*. The Fellows, however, receive their copies at the Society's apartments.

[3] Mr. Baker was a learned antiquary and naturalist, on which subjects he communicated a great number of interesting papers to the *Philosophical Transactions*. He was born in London in 1704, and was brought up to the business of a bookseller, which he quitted to devote himself to teaching deaf and dumb persons to read and speak, by which he acquired a competent fortune. He married a daughter of the celebrated Daniel De Foe, by whom he had two sons.

Mr. Baker died on the 25th November, 1774, his executors shortly afterwards submitted his bequest to the President and Council, who agreed to "accept of the legacy on the conditions expressed by the Testator[4]."

In 1775, the executors paid the sum of one hundred pounds to the President and Council; and the same year, Mr. Peter Woulfe was appointed to deliver the lecture, which he continued to do annually until 1778. From that period, it has been the annual custom to appoint some distinguished Fellow to deliver a lecture, or to nominate a Paper in the *Transactions*, as the lecture for the year. Of this nature, are the excellent Papers by Sir Humphry Davy, in the years 1807, 8, 9, 10, and 11.

During the years 1772 to 1782, the name of John Hunter is of frequent occurrence in the Journal-books. He was elected a Fellow of the Society in 1767[5]; and contributed several Papers to the *Philosophical Transactions* on subjects connected with Anatomy and Physiology. He was selected to deliver the Croonian lecture for several years in succession, and received the Copley Medal in 1787, for his Papers "On the Ovaria," "On the Identity of the Dog," and "On the Anatomy of Whales." On this occasion,

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[4] Mr. Baker, in another part of his will, devised 500*l.* to the Society in case of the decease of his grandson before attaining his majority.

[5] His certificate describes him as well-skilled in natural history and anatomy, and is signed by Lord Morton, J. Ellis, D. Solander, M. Maty, G. Knight, W. Watson, and R. Warren.

Sir Joseph Banks, in his capacity of President, thus addressed Mr. Hunter :—

"To give a due tribute of praise to the repeated exertions by which you have, for a series of years, promoted the increase of science, and enriched the volumes of the *Philosophical Transactions*, is a business of great difficulty; but as the approbation of the Committees who have from time to time ordered them to be printed, is a more valuable, as well as a more unequivocal proof of their merit, than the testimony of any individual can afford them, I may, I trust, be allowed to decline a task to the performance of which I find myself by no means equal.

"I feel on this occasion a more than usual satisfaction, in taking upon me the pleasing office of bestowing a medal, as the quantity of information contained in the Papers which the Society reward is so great, and the nature and variety of it so truly interesting, as to insure the unanimous approbation of the decision of your Council.

"To you then, Mr. Hunter, I most willingly deliver this testimony of the regard of the Royal Society; this reward by which she distinguishes those who are in her opinion the most meritorious; and though I deem it impolitic to attempt to increase that love of science which has enabled you, occupied as you are by the duties of a profession, so effectually to promote the cause of learning, let me exhort you to continue it; and be assured, Sir, that this Society will, with gratitude bear daily testimony to the advantage which mankind receives from the natural sagacity of your professional, and the indefatigable industry of your scientific exertions[6]."

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[6] Journal-book, Vol. XXXIII. p. 75.

This attests how highly Hunter's researches were valued by the Society, of which he must be regarded as one of the brightest ornaments[7].

It is to be regretted that the annals of the Society present other, and less pleasing circumstances which mark the epoch of Sir John Pringle's Presidency, and which no faithful historian can pass over silently. This remark applies to the prejudiced, but unfortunate dispute between Mr. Wilson and other electricians of the Society, respecting the relative qualities of pointed and blunt, or, as they were called, knobbed lightning conductors. The facts relating to this affair

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[7] Some idea may be formed of Hunter's extraordinary diligence, by the fact, that his museum contained at the time of his death, upwards of 10,000 preparations, illustrative of human and comparative anatomy, physiology and pathology, and natural history. The museum was sold to government for 15,000*l*., and was presented to the College of Surgeons, by whom it has been greatly augmented and enlarged. In 1845 it contained the following specimens :

	Hunterian. No. of Specimens.	Collegiate. No. of Specimens.
Physiological Department, or Normal Structures :		
Osteology	963	2119
Dry Preparations	617	240
Preparations in Spirits	3745	1998
Natural History	1343	427
Fossils	1215	1200
Pathological Department, or Abnormal Structures:		
Preparations in Spirits	1084	2142
,, in a Dry State	625	1365
Monster and Congenital Malformations	218	181
Calculi and Concretions	536	884
Microscopic Preparations of Normal and Abnormal Structures	217	1791
	10,563	12,347
Total	22,910	

are so curious, as to deserve attentive consideration; before, however, entering on the history of the dispute, which eventually assumed a political character, it will be necessary to give some account of the invention of lightning-conductors.

In 1727, Franklin discovered the power of rods and points in conducting, and drawing off electricity[8]. In 1749, he wrote, "May not the knowledge of this power of points be of use to mankind in preserving houses, churches, ships, &c. from lightning, by directing us to fix on the highest parts of those edifices upright rods of iron, made sharp as a needle, and gilt to prevent rusting, and from the foot of those rods a wire down the outside of the building into the ground, or down the shrouds of a ship, and down her side, till it reaches the water? Would not these pointed rods probably draw the electrical fire silently out of a cloud before it came nigh enough to strike, and thereby secure us from that most sudden and terrible mischief[9]?" Experiments followed, and Franklin became convinced of the efficacy of pointed conductors. But he failed in convincing electricians generally. The Abbè Nollet, who was regarded as an authority in France on electricity, though opposed to Franklin, stated in a memoir read before the Academy of Sciences, that he disapproved of conductors in any shape. These are his words: "*Toutes ces pointes de fer qu'on dresse en l'air, soit comme électroscopes, soit comme préservatifs, sont plus propre à nous* attirer le feu du tonnerre, qu'a nous en préserver; *et je persiste à dire que le projet d'épuiser une nuée orageuse du feu dont elle est chargée n'est pas celui d'un physicien*[10]." Such was Nollet's opinion, and although his theories have long since been exploded, yet, at the period alluded to, he had several followers. But, in spite of all opposition, lightning-conductors gradually came into use.

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[8] Humboldt informs us, that "the most important ancient notice of the relations between lightning and conducting metals is that of Ctesias, in his *Indica*, cap. IV. p. 169. He possessed two iron swords, presents from the King Artaxerxes Mnemon, and from his mother Parysatis, which, when planted in the earth, averted clouds, hail, and *strokes of lightning*. He had himself seen the operation, for the King had twice made the experiment before his eyes." *Cosmos*, Vol. II. N. 186. Ctesias was a man of great learning. He was a contemporary of Xenophon, and lived for a number of years at the court of Artaxerxes Mnemon, as private physician to the king. Diodorus states, that Ctesias was highly honoured at the Persian Court. His ('Ινδικά), to which Humboldt refers, is full of curious matter, and presents us with a picture of India, such as it was conceived by the Persians. An abridged edition was printed by Stephens in 1594.

[9] Franklin's *Works*, Vol. V. p. 236.

In March, 1769, the Dean and Chapter of St. Paul's addressed a letter to the Society, requesting their opinion as to the best and most effectual method of fixing electrical conductors on the cathedral. They were led to make this application in consequence of St. Bride's church having been struck by lightning and seriously injured. A Committee was accordingly appointed, consisting of John Canton[11], Edward Delaval, Benjamin Franklin, William Watson, and Benjamin Wilson, who examined the cathedral with great care, and reported to the Society on the 7th June. In this report no mention is made of pointed conductors; the great object was "to make a complete metallic communication, between the cross placed over the lanthorn and the leaden covering of the great dome; as from its height, if any lightning struck it, it would most probably affect the cross." This was done, and the water-pipes were made to serve as conductors from the roof to the ground. The Dean and Chapter appear to have been satisfied with the report and labours of the Committee.

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[10] *Mémoires sur les Effets du Tonnerre.*

[11] See his *Life in the Biog. Britt.*

In 1772, the Government received intelligence of the destruction of several powder magazines at Brescia, by lightning, and as their own magazines at Purfleet were totally unprotected, they determined on taking measures to defend them from the electric fluid. With this view, the Society were requested to give their opinion on the best form of lightning-conductors for the protection of the magazines.

The Council appointed a Committee, consisting of Franklin, Cavendish, Watson, Robertson, and Wilson, to examine the buildings at Purfleet, and to report, in conformity with the wish of Government. They inspected the buildings with great care, and with the exception of the last-named gentleman, strongly recommended *pointed conductors*[12]. Mr. Wilson dissented entirely from this recommendation, and drew up the subjoined protest:

> "I dissent from the report in that part only which recommends that each conductor should terminate in a *point*.
>
> "My reason for dissenting is, that such conductors

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[12] The Report of the Committee was drawn up by Franklin; it is published in the 63rd volume of the *Transactions*.

are, in my opinion, less safe than those which are not *pointed.*

"Every *point,* as such, I consider as soliciting the lightning, and by that means not only contributing to *increase* the quantity of every actual discharge, but also frequently occasioning a discharge, when it might not otherwise have happened.

"If, therefore, we invite the lightning, while we are ignorant what the quantity or the effects of it may be, we may be *promoting* the very mischief we mean to prevent.

"Whereas if, instead of pointed, we make use of blunted conductors, those will as effectually answer the purpose of conveying away the lightning *safely,* without that tendency to *increase or invite* it."

Mr. Wilson was not satisfied with this protest alone: he published a long Paper in the *Transactions,* in favour of blunt conductors, although the soundness of his judgment was refuted in the strongest manner, by Franklin, Nairne, Henley, Swift, and other electricians. But Wilson did not stand alone in this opinion; Franklin, writing to a friend in America at this period, says, "Here are some electricians that recommend knobs instead of points on the upper ends of the rods, from a supposition that the points invite the stroke. It is true that points draw electricity at greater distances in the gradual, silent way; but knobs will draw at the greatest distance a stroke[13]." The Meetings of the Society were occupied by controversies upon conductors, and a variety of Papers in support of opinions, on both sides, appeared in the *Philosophical Transactions.*

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[13] *Works,* Vol. VIII. p. 364.

Notwithstanding Mr. Wilson's protest, Government determined on using pointed conductors; and they were accordingly erected in the manner recommended by the Committee. Now it happened, unfortunately, that in May, 1777, the magazines at Purfleet were struck by lightning and slightly injured, though the powder was not exploded; and a house at Tenterden, which was also furnished with pointed conductors, was struck at the same time. These accidents furnished a great triumph to Mr. Wilson. The Board of Ordnance addressed a letter to the Royal Society, requesting their advice upon the occasion, and, after considerable debate, a second Committee was appointed, consisting of the President and Secretaries, and Messrs. Henley, Lane, and Nairne. These gentlemen, after having carefully examined the magazines, recorded their opinion unanimously in favour of pointed conductors.

Wilson now instituted a series of experiments, by which he came to the same conclusion as before, respecting the great advantages of blunt over pointed conductors. He drew up a long Paper, giving an account of these experiments, and sent it to the Board of Ordnance, who referred it to the Royal Society. The reading of the Paper occupied the time of several Meetings; when it was finished, a Committee, consisting of the Hon. Henry Cavendish, Mr. Henley, Mr. Lane, Lord Mahon, Mr. Nairne, Dr. Priestley, and Dr. Watson, was appointed to test the author's experiments, and the results contained in his Paper.

The Committee, as may be imagined, reported against the conclusions; on which, Wilson, who appears to have been greatly incensed at this new opinion in favour of Franklin's pointed conductors, endeavoured to persuade Government, that the Society, as a body, did not agree with the report of the several Committees. This occasioned the Board of Ordnance to write to the Secretary:—

"Sir, "*Office of Ordnance, May* 19, 1778.

"Having laid before the principal officers of the Ordnance Sir John Pringle's letter of the 19th March last, I have received their commands to signify to you, for the information of the Royal Society, that they followed implicitly the directions of the first and second Committees of the Society with respect to Conductors at Purfleet, because they conceived that the Reports had the sanction of the Society.

"They have been informed, however, that when the Report of the last Committee was laid before the Society, it was determined by a great majority that the Report should not be considered as the opinion of the Society at large; from which it should seem that the greater part of the Society did not approve of such Report.

"The Board of Ordnance having received this information from those to whom they cannot but give credit, and the President's letter above referred to, which inclosed the Report of the Committee, containing nothing contradictory to this information; they therefore, in a matter of so great consequence to the public, desire that it may be stated to them what may be the opinion of the learned Society at large, with regard to securing His Majesty's magazines from accidents by lightning.

"I am, &c.,

"John Boddington.

"*The Secretary, Royal Society.*"

This letter was productive of much warm and angry discussion, at a Meeting specially summoned to take it into consideration.

Several resolutions and amendments were moved and seconded by the leading Fellows, but not carried. Eventually, it was determined that a reply should be written by the Secretary, to the Secretary of the Board of Ordnance. It ran thus:—

"Sir,

"In answer to your letter of the 19th May, I am directed to inform you, that the Society has never since its first institution given an opinion as a body at large, but constantly by Committees. And that in the particular instance of the questions lately proposed by the Board of Ordnance, the Society has no reason to be dissatisfied with the report of its Committee."

This letter had the effect of increasing the anger of Wilson and his friends, and, strange as it now appears, the dispute, which had its origin in a question of natural philosophy, was made one of party politics. This is attributable to the fact, that England was at the height of her quarrel with her American Colonies, and it was Franklin who invented pointed conductors.

How this philosopher was affected by the dispute, appears in the following authentic letter, addressed to Dr. Ingenhousz, who had espoused the subject with considerable warmth against Wilson. The letter was written from Passy, where Franklin had taken up his residence after leaving England. It is dated October 14, 1777.

"Sir,

"I am much obliged by your communication of the letter from England. I am of your opinion, that it is not proper for publication here. Our friends' expressions concerning Mr. Wilson will be thought too angry to be made use of by one philosopher, when speaking of another, and on a philosophical question. He seems as much heated about this *one point*, as the Jansenists and Molenists were about the *five*. As to my writing anything on the subject which you seem to desire, I think it not necessary, especially as I have already expressed my opinion upon it, in a Paper read to the Committee, who ordered the conductors at Purfleet; which Paper is printed in the last French edition of my writings.

"I have never entered into any controversy in defence of my philosophical opinions; I leave them to take their chance in the world. If they are *right*, truth and experience will support them; if *wrong*, they ought to be refuted and rejected. Disputes are apt to sour one's temper and disturb one's quiet. I have no private interest in the reception of my inventions by the world, having never made, nor proposed to make, the least profit by any of them. The King's changing his *pointed* conductors for *blunt* ones is, therefore, a matter of small importance to me. If I had a wish about it, it would be, that he had rejected them altogether as ineffectual. For it is only since he thought himself and family safe from the thunder of Heaven, that he dared to use his own thunder in destroying his innocent subjects.

"I am, &c.,

"B. Franklin."

It was no longer scientific men who were allowed to decide the question, but political partisans, so that the advocates of pointed conductors soon became identified with the insurgent colonists; and those opposed to blunt points were considered as disaffected subjects. As usual in such cases, the populace, and even the higher classes of society, took up the quarrel without inquiring into its merits, or, indeed, knowing anything about the matter in a scientific point of view[14]. Wilson thus found protection and support, as he would have done against the theorem of Pythagoras, had geometry been the subject of dispute[15].

But the most extraordinary part of this dispute is, that George III. is stated to have taken the side of Wilson, not on scientific grounds, but from political motives; and that he even had blunt conductors fixed on his palace, and actually endeavoured to make the Royal Society rescind their resolutions in favour of pointed conductors. His Majesty, it is declared, had an interview with Sir John Pringle, during which he earnestly entreated him to use his influence in supporting Mr. Wilson. The reply of the President was highly honourable to himself and the Society whom he represented. It was to the effect, that duty as well as inclination would always induce him to execute his Majesty's wishes to the utmost of his power; but, "Sire," said he, "I cannot reverse the laws and operations of nature[16]."

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[14] This recalls to mind the words of Quintilian, who says, "there are persons who though they may have resolved to be strictly honest in all their actions, yet will not scruple to use every argument that can be of the slightest service to the cause which they have undertaken to defend." L. xi. 1.

[15] "Thus with many," says a writer of that period, "the opinions of a philosopher as to the *blunts*, and the *points*, were regarded as the index of his opinions as to the American war; and the celebrated dispute among the "*little*" and the "*big-endians*," recorded by Lemuel Gulliver, furnished an apt representation of the folly and the rancour which found their way into this discussion."

[16] It was shortly after this occurrence that a friend of Dr. Franklin's wrote this epigram:

"While you, great George, for knowledge hunt,
And sharp conductors change for blunt,

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This occurred in the latter end of 1777, and at the Anniversary in that year Sir John Pringle resigned the Presidency, and Sir Joseph Banks was elected his successor. It is not surprising, when we bear in mind that this quarrel had existed three years, and was productive of much ill feeling, that it should have been generally adduced as the reason of Sir John's resignation, though, as we have seen, Dr. Kippis, his intimate friend and biographer, contradicts the report[17].

The Society entertained a high sense of Sir John Pringle's services, as appears from the following resolution, passed at the first ordinary Meeting after the Anniversary:

"That the most ample thanks the Society can bestow, be returned to the late worthy President, Sir John Pringle, Bart., for the unremitting diligence with which he has at all times promoted the welfare and interests of the Society, and for the learned and elaborate discourses with which he has from time to time illustrated the prize dissertations, adding by that means to the medal, a lustre which it could never have obtained, but through the medium of his labours, and a value which rendered it the ambition of all who wrote, and

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The nation's out of joint:
Franklin a wiser course pursues,
And all your thunder useless views,
By keeping to the *point.*"

[17] In a review of the proceedings of the Royal Society, published in Tilloch's *Phil. Mag.* for 1820, it is stated, that when Sir John Pringle admitted his inability to alter the laws of nature, the King replied, "Perhaps, Sir John, you had better resign." The reader, who may be desirous of further information relative to this electrical quarrel, is referred to Franklin's *Works*, edited by Jared Sparks; and Lord Mahon's, Dr. Musgrave's, and Nairne's Experiments.

the pride of those who were fortunate enough to obtain it."

The concluding portion of this resolution refers to the discourses which Sir John Pringle was in the habit of delivering at the Anniversaries, and which were so admirable, that their publication was immediately requested by the Society.

In reference to these discourses, Dr. Kippis says, "If he had continued to preside in the Chair of the Royal Society, he would, no doubt, have found other occasions of displaying his acquaintance with the history of philosophy. But the opportunities which he had of signalizing himself in this respect were important in themselves, happily varied and sufficient to gain him a solid and lasting reputation. Perhaps it would not be desirable that publications of such a nature should be very numerous, since, by that means, they might lose by degrees ther novelty, their utility, and their acceptance. We do not therefore think that in this particular view Sir John Pringle ought to be considered as a model to his successors. It is best that each President should distinguish himself in that way which is peculiarly suited to his own pursuits and studies; for thus every valuable object being regarded in its turn, the honour of the Society, and the interests of philosophical and natural knowledge will most essentially be promoted[18]."

Sir Joseph Banks[19] was born on the 2nd of February, 1743, O. S., in Argyle Street, London[20]. He was descended from an ancient and wealthy family, established since the reign of Edward III., first in the West Riding of Yorkshire, and afterwards in Lincolnshire, where they possessed large estates from the end of the seventeenth century; and a considerable accession of fortune came to them early in the eighteenth, by marriage with an heiress in Derbyshire, named Hodgkinson, whose estates were severed from those in Lincolnshire until 1792, when the whole fortune united in the person of Sir Joseph. He was the only son of Mr. William Banks, whose father had been sheriff of Lincolnshire, and represented Peterborough in Parliament for some years.

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[18] *Life*, by Kippis, p. 48.

[19] I am indebted to Robert Brown, Esq., F.R.S., for assistance in compiling this memoir.

[20] The Register-book of the Royal Society also states that he was born on the 2nd February.

Sir Joseph received his early education from a private tutor at Revesby, in Lincolnshire, the seat of his father. When nine years old, he was sent to Harrow; and from thence to Eton, where, it is stated, he at first evinced a much greater fondness for active sports, than for study. Here it was that he acquired his love for botany, which gave a new current to his thoughts, and suddenly turned the youth into a studious man. This happy change, as he afterwards explained to Sir Everard Home, was thus occasioned:

"One fine evening he had been bathing with other boys, but having remained a long time in the water, he found, when he had dressed, all his companions had gone home. He proceeded leisurely along a lane, the sides of which were richly enamelled with flowers. These attracted his attention, and gazing earnestly at them, he involuntarily exclaimed, How beautiful; and, after some reflection, added, It is surely more natural that I should be taught to know all these productions of nature, in preference to Greek and Latin: but the latter is my father's command, and it is my duty to obey him: I will, however, make myself acquainted with all these different plants for my own pleasure and gratification."

He began forthwith to teach himself botany, and frequently referred to some old women, who gained a living by culling simples for apothecaries, and to whom he gave sixpence for every material piece of information. On his return home for the holidays, he was greatly delighted at finding a book in his mother's dressing-room, in which all the plants he had met with were not only described, but engraved. This, which proved to be an imperfect copy of Gerard's *Herbal*, he carried with him to school. There he continued collecting plants, and he also made a collection of insects. In 1760, he was entered a gentleman-commoner at Christ-Church, Oxford. Increased leisure gave him, in his new position, additional means of studying his favourite science. His zeal for the acquirement of botanical knowledge was so great, that finding no lectures were given on that science in the University, he applied to Dr. Sibthorpe, the botanical professor, for permission to procure a qualified lecturer, and having obtained his consent, he went to Cambridge, and engaged Mr. Lyons of that University, to lecture at Oxford[21]. Banks' studies soon acquired him the reputation of being learned in natural history, and it is stated, that when his fellow-students were desirous of information on this science, they were in the habit of saying, "We must go to Banks."

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[21] Mr. Lyons was a good practical astronomer, as well as botanist. The friendship of Sir Joseph Banks subsequently obtained for him the appointment of Astronomer to Captain Phipps on his Polar voyage.

Having taken an honorary degree, he left Oxford in December 1763. His father had died in 1761, so that, having become of age within a month after quitting the University, he became the uncontrolled possessor of a large fortune, and of his own actions. And now it was that his love of science proved eminently useful to England. For instead of abandoning himself to a course of dissipation, which young men of fortune frequently plunge into, after leaving the University, Banks continued steadily attached to scientific studies.

Pursuing various branches of natural history in the country, angling became a favourite recreation; and it was on one of his fishing excursions, that he became acquainted with Lord Sandwich, who, as first Lord of the Admiralty, I have had occasion to bring more than once before the reader.

In May, 1766, Sir Joseph was elected a Fellow of the Royal Society; and the same year he accompanied his friend Lieutenant Phipps, commanding the *Niger*, to Newfoundland and Labrador, where, whilst the vessel was engaged in protecting the fisheries, he made collections in natural history. In 1767 he returned home by Lisbon, from whence he brought the first specimen of caoutchouc to England[22].

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[22] In an original MS. letter now before me, from Sir Joseph Banks to Mr. Canton, written in 1767, the following passage occurs:— "With this you receive two balls of the *new Elastick Substance*, which I beg pardon for having so long omitted to send you." It is almost needless to add, that the *substance* alluded to is caoutchouc.

It is unnecessary to do more than allude to Cook's expedition to the Pacific, the details of which are familiar to the reader, who will remember the active and important share that Sir Joseph Banks took in all the scientific proceedings.

On his return to England, he was received with acclamation, and, accompanied by Sir John Pringle and Dr. Solander, had the honour of an interview with George III., which lasted several hours.

The extensive collections of plants which he had made, were thrown open in the most liberal manner to the study of all capable of appreciating them. Fabricius described his insects. He gave specimens of all his fishes to Broussonet for his *Ichthyology;* and the celebrated work of Mr. Robert Brown, *On the Plants of New Holland*, was conducted under the eye of Sir Joseph Banks, and in the midst of his collections.

The reader is aware of the disappointment Sir Joseph experienced on the occasion of Cook's second voyage, when, after having made the most extensive preparations for the expedition, miserable feelings on the part of certain authorities at the Navy Board frustrated his hopes. It does not properly enter into my province to discuss the circumstances which led to the expedition leaving our shores without the celebrated botanist[23]. I cannot, however, forbear joining the illustrious Cuvier, in expressing my surprise that Captain Cook should have sailed without his former companion.

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[23] See the *Annual Register* for 1772, and the *Gentleman's Magazine* for the same year, for some curious information on this subject. The latter publication throws all the blame on Captain Cook, but with some injustice, as in a manly letter from Cook to Sir Joseph Banks, written shortly after his departure, he says: "Some cross circumstances which happened at the latter part of the equipment of the *Resolution* created, I have reason to think, a coolness betwixt you

It is a noble feature in Sir Joseph Banks' character, that although thus bitterly disappointed, he used his utmost exertions to promote the objects of the voyage.

Unwilling that all his extensive preparations should have been made in vain, Sir Joseph determined to undertake a voyage to Iceland. He hired a vessel, for which he paid 100*l.* per month, and having prepared her for the expedition, he sailed on the 12th July, 1772, accompanied by Dr. Solander, Dr. Lind, Dr. Von Troil[24], and various draughtsmen and friends.

On their way to Iceland they visited Staffa, and thoroughly explored this remarkable island; an interesting account of which was afterwards published from Sir Joseph's Journal, in Pennant's *Tour in Scotland.*

The expedition arrived safely at its destination. A month was devoted to the examination of the island, and, on the 12th September, the explorers stood on the summit of Hecla. The natural productions of the island were carefully investigated, and a rich collection of botanical and other specimens was made. Sir Joseph Banks purchased a large number of Icelandic books and manuscripts, which he afterwards presented to the British Museum. Dr. Von Troil published a full and interesting narrative of the

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you and I; but I can by no means think it was sufficient to break off all correspondence with a man I am under many obligations to."

[24] He was afterwards created Archbishop of Upsal.

voyage in a work entitled, *Bref Rörande en Resa til Island.*

This visit proved of signal service to the Icelanders; for when in 1808, they were in a state of famine, Sir Joseph Banks's benevolence and powerful interest, brought about the adoption of measures, which absolutely saved the poor inhabitants from starvation. The circumstances of this case are so eminently illustrative of the energy and great kindness of heart of the subject of this memoir, that it affords me peculiar pleasure to record them in the language of a gentleman, to whom no small share of praise is due for his exertions in behalf of the Icelanders on the above occasion; and who, at my desire, communicated to me the following particulars.

"*Board of Trade, Whitehall,* 11*th February,* 1847.

"MY DEAR MR. WELD,

"I HAVE much pleasure in complying with your request, to repeat to you in writing the circumstance that many years ago first brought me into communication with Sir Joseph Banks.

"I think it was in or about the year 1808, when, as a consequence of our seizure of the Danish Fleet in the preceding year, we were at war with Denmark; the Island of Iceland was afflicted with grievous dearth, so that almost the only resource of the inhabitants for obtaining food, was to stand waiting on the shores in order to collect the weed left there by the receding tides. England then crowded every sea with her ships, so that any vessel that should have left the ports of Denmark with succours for the suffering colonists, would have been exposed to almost certain capture. Under these circumstances a merchant from Copenhagen, Mr. Hans Claussen, arrived in England with introductions to the mercantile house in this City, in whose office I was at that time confidentially employed, conducting a branch of their business; and Mr. Claussen's affairs were placed in my hands. His object was to obtain from the British Government licences for the protection of Danish ships, which should be employed in conveying provisions to Iceland; an object for the obtaining of which he soon enlisted my warmest sympathies, and secured my most active exertions. Daily did I present myself at the Board of Trade, provided with the most touching Memorials, the produce of my youthful pen, and the terms of which would, I dare say, excite a smile if I could peruse them at this more sober period of life. Doubtless, they produced some such effect upon the late Lord Bathurst and Mr. George Rose, the ministers to whom they were officially addressed; for during several weeks my eloquence was productive only of refusals.

"After this long interval, now nearly 40 years, I can recal vividly to mind the feeling with which, during the many nights in which I was kept wakeful by anxiety, I first recollected that Sir Joseph Banks, who had visited Iceland in 1772, was an honorary Member of the Board of Trade, and conceived the hope that he might be induced to use his privilege, as such, in favour of a suffering and unoffending people, by whom, 35 years before, he had been received with hospitality. I slept none that night, but lay revolving the arguments which I should use, and arranging the language in which to clothe them, and which would be most likely to secure the powerful aid of Sir Joseph, whom at that time I had never seen. By day-break I was at my desk, and at an early hour was at his door with my letter,—too early to see him. I was not long, however, in learning that I had succeeded in securing his most zealous cooperation. On that same day Sir Joseph Banks attended at the Board of Trade, and did not cease to employ his mind and heart in the service, until he succeeded to the full extent of our petitions. His kindness was all the greater by reason of the bodily infirmity, which at that time required that he should be carried to and from his carriage, and which occasioned every exertion to be accompanied by suffering.

"Mr. Claussen left England with his licences, and I have understood that he realised a handsome fortune by means of them, but I never had any direct communication with him afterwards.

"Believe me, &c.,

"G. R. Porter.

"*C. R. Weld, Esq. Royal Society.*"

On his return to England, Sir Joseph Banks settled in London, and devoted his time and fortune to the promotion of science. His large house in Soho Square, with its fine library and unequalled botanical collections, was always open to scientific men. Indeed, his abode became a rallying point for foreigners, and his own countrymen, who, like himself, were fond of science; and his greatest pleasure was seeing his friends about him enjoying his rich library. It is said that his collections and books were arranged in the best manner, and that order and regularity prevailed throughout his establishment. I am well inclined to credit this, for, when in Lincolnshire a few years ago, I paid a visit to Revesby, the country-seat of Sir Joseph, under the guidance of the vicar of the parish, and had an opportunity of inspecting the offices and study of its former proprietor, the arrangements of which were admirable. Nests of drawers numbered consecutively lined the walls; and it was Sir Joseph's custom to have two catalogues, descriptive of their contents; one of which always accompanied him, the other remained at Revesby. Thus, if when in London, he required any paper contained in the drawers, he had merely to refer to his catalogue, and sending the number to his steward at Revesby, the latter was enabled, by means of the Catalogue in the office, to put his hand in a moment upon the desired document, and forward it to his master.

All his letters were preserved in volumes bearing appropriate dates, and placed in regular series. The rooms, three in number[25], gave evidence of the man of order and business-like habits. I remember being shown a book exclusively devoted to the registration of his gifts of venison, many haunches of which were sent to Fellows of the Royal Society.

In 1778, as before stated, the resignation of Sir John Pringle took place. A general opinion prevailed, that no one was better qualified to occupy the vacant chair than Sir Joseph Banks. He was, as we have seen already, on the Council of the Society, and took a warm interest in its affairs. He was accordingly elected President, and immediately devoted himself with great zeal to the discharge of his duties. How well he performed these, we shall have many opportunities of showing; indeed, the history of the Society during his long Presidency, is intimately connected with his life[26]. It will, therefore, be unnecessary to do more here, than briefly remark, that in his anxiety to maintain the high dignity of the Society, he early took measures, which gave great discontent to a party, and led to dissensions, of which it will be my duty to give a candid and impartial account. Happily they were only the summer's thunder-storm, which having burst, left a purer atmosphere behind, in which Sir Joseph Banks lived undisturbed, though not inactive, during the remainder of his career.

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[25] These, at the period of my visit, were nearly the last vestiges of the old mansion of Revesby. The new proprietor, Mr. Stanhope, was busily occupied pulling down the house, to make way for a more imposing edifice, which has since risen.

In 1779, he married Dorothea, eldest daughter of William Weston Hugessen, Esq., of Provender, in the parish of Norton, in Kent. In 1781, he was created a baronet, and in 1795, he was invested with the order of the Bath. Though often solicited to sit in Parliament, he always declined the honour, preferring rather to dedicate all his time to the Royal Society and science. In 1797, he was made a Privy Councillor. In 1802, he was elected a foreign Member of the French Institute. This great honour, it is said, was in some measure brought about by his having interfered successfully, on no less than ten different occasions, in restoring to France collections of natural history, which had been captured by English vessels; he even sent as far as the Cape of Good Hope to procure some chests belonging to Humboldt; and it is well known that his active exertions liberated many scientific men from foreign prisons.

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[26] Mr. Brown informs me, that Sir Joseph visited Paris, accompanied by Sir Charles Blagden, for the purpose of effecting a scientific correspondence between the Royal Society and the French Academy.

He was the founder of the African Association; and it is related that "when Ledyard was in want of support on his celebrated journey, it was on Sir Joseph Banks that he drew a bill, which, in the remote region where the traveller then was, found an immediate honour and discount." He used great exertions to mitigate the captivity of the unfortunate Flinders, and it was principally by his intercession that our Government issued orders in favour of La Pérouse.

Although botany was Banks' favourite pursuit, it did not absorb his exclusive attention. We find him throughout his life promoting science, and always ready to contribute his time and purse to its advancement. When Dr. Blagden instituted his experiments upon the power of existing in rooms heated to an excessive temperature, Sir Joseph Banks was one of the first to enter an apartment in which the thermometer stood at nearly 260°.[27] There are many other instances of his willingness to arrive at philosophical truths, at personal inconvenience. So great an admirer was John Hunter of Sir Joseph Banks's character, that he used to say, "If any man was to be envied, it was he; for he was engaged in the most rational pursuits that can occupy the mind of man; his income enabled him to carry them on without embarrassment, the sublimity of their nature and the vastness of their extent made it impossible for him to tire, or be out of employment[28]."

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[27] See *Phil. Trans.*, Vol. LXV. for an account of these experiments. It is stated that Banks was the only person "who sweated profusely." But Sir F. Chantrey's feat is even more extraordinary. "Accompanied by five or six friends, he entered a furnace used for drying moulds, and after remaining two minutes, they brought out a thermometer which stood at 320°. Some of the party experienced sharp pains in the tips of their ears, and in the septum of the nose, while others felt a pain in their eyes." Brewster's *Natural Magic*, p. 312.

His reputation was as extensive as the bounds of civilization. In London he was known to all: and it is related, that when Omai, the Tahitian, who was brought to England on the return of Cook's second expedition, and to whom Sir Joseph manifested great kindness, lost himself in the streets of the metropolis, he was accustomed to call out, "Sir Joseph Banks, take me to Sir Joseph Banks;" and so well was the hospitable abode of his benefactor known, that his wishes were always carried into execution.

At length, full of years and honour, this patron of science died[29]. The event took place at his house at Spring Grove, near London, on the 19th June, 1820. He left the greater part of his property to Lady Banks, at whose death, in default of issue, the estates devolved to Sir Henry Hawley and Colonel Stanhope. By a codicil, dated 21st January, 1820, he gives Robert Brown, Esq., F.R.S., an annuity of 200*l.*, with a life-use of his library, collections, &c., kept in the back part of his house, in Soho Square; and after the decease of Mr. Brown, he gives the same to the trustees of the British Museum.

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[28] *Hunt. Oration.*, by Everard Home, p. 33.

[29] Sir Everard Home states, that Sir Joseph Banks was of opinion, that it was the duty of every man of independent fortune to be always ready to give his services gratis to his country when required. "He carried this so far," adds Sir Everard, "as to choose a lizard for his crest, as the animal that is most useful, living on insects, but in no way destroying the food of man."

Mr. Brown occupies the rooms in which Sir Joseph Banks received the Fellows of the Royal Society. The front part of the house, looking upon Soho Square, containing the drawing and other rooms, are now devoted to the Linnean Society.

It is certainly a remarkable fact, that Sir Joseph Banks does not in his will even allude to the Society he presided over for above forty years, and from whose connexion he derived so much renown. His fortune was of that magnitude (above 30,000*l* a year), that a small bequest to the funds of the Society (which were very much less at that period than they are at present) would have been scarcely missed, whilst it would have been of great service to science. But this is only one of the many instances of the strange contradictions manifested between men's lives and their testamentary dispositions. One article, however, which belonged to Sir Joseph Banks, the Society possess; and I am led to mention this in consequence of an amusing anecdote connected with it, related to me by Mr. Babbage, which I have not seen in print. The article in question is a very delicate balance, constructed by Ramsden.

Upon the decease of Sir Joseph Banks, the Secretaries wrote to his widow, apprising her that the balance was lying in the apartments of the Society, and requesting to know her wishes respecting it: "Pay it into Coutts'," was her ladyship's reply.

This memoir[30] cannot be more appropriately concluded than by a quotation from Baron Cuvier's *éloge* of Sir Joseph Banks, read before the French Academy, on the 2nd April, 1821.

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[30] All must regret, that the life of Sir Joseph Banks remains to be written. It is a reproach to scientific England, that so eminent a man should be without a biographer. Had he been a warrior or hero of romance, his deeds would long ere this have been

"*Les ouvrages que laisse après lui, l'homme dont nous avons aujourd'hui à vous entretenir, se réduisent à quelques feuilles, et cependant son nom brillera avec éclat dans l'histoire des sciences. M. Banks a rempli la noble poste de Président de la Société Royale pendant quarante-une années consécutives, durée plus longue que celle d'aucun de ses prédécesseurs.*

"*Certainement, si l'on jette un coup d'œil sur l'histoire de la Société Royale pendant ces quarante-une années, on ne trouvera pas qu'elle ait eu à se repentir de sa résolution. Pendant cette époque si mémorable dans l'histoire de l'esprit humain, les savans anglais, il nous est honorable de le dire, nous à qui l'on ne contestera pas le droit de rendre ce témoignage, et qui pouvons le rendre sans crainte pour nous mêmes, les savans anglais ont pris une part aussi glorieuse que ceux d'aucune autre nation à ces travaux de l'esprit communs à tous les peuples civilisés; ils ont affronté les glaces de l'un et de l'autre pôle; ils n'ont laissé dans les deux océans aucun recoin qu'ils n'aient visité; ils ont décuplé le catalogue des règnes de la nature; le ciel a été peuplé par eux de planètes, de satellites, de phénomènes inouis; ils ont compté, pour ainsi dire, les étoiles de la voie lactée; si la chimie a pris une face nouvelle, les faits qu'ils lui ont fournis ont essentiellement contribué à cette métamorphose; l'air inflammable, l'air pur, l'air phlogistiqué, leur sont dus; ils ont découvert la décomposition de l'eau; des métaux nouveaux et en grand nombre sont les produits de leurs analyses; la nature des alcalis fixes n'a été démontrée que par eux; la mécanique, à leur voix, a*

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chronicled. As it is, his greater merits remain unrecorded. Let those who are to blame in this matter remember that posterity will judge them.

enfanté des miracles, et placé leur pays au-dessus des autres dans presque tous les genres de fabrications ; et si, comme aucun homme raisonnable n'en peut douter, de pareils succès proviennent de leur énergie personnelle et de l'esprit général de leur nation, beaucoup plus que de l'influence d'un individu, dans quelque position qu'il pût être, toujours faudra-t-il avouer que M. Banks n'a point abusé de sa position, et que son influence n'a rien eu de funeste. Le recueil même des mémoires de la compagnie, sur lequel on pourrait sans exagération supposer au président une action plus effective que sur la marche des sciences, a pris évidemment plus de richesse ; il a paru plus exactement et sous des formes plus dignes d'un si bel ouvrage. C'est aussi du temps de M. Banks que la Société elle-même a été mieux traitée par le Gouvernement, et qu'elle a occupé dans un des palais royaux des appartemens dignes d'un corps, qui fait tant d'honneur à la nation[31]."

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[31] *Mémoires de l'Institut.*, 1821, p. 224.

CHAPTER V.

Government announce their intention of providing Apartments for the Society in Somerset House—Limited Accommodation—Letter from Sir William Chambers—The Society present their Repository to the British Museum—Specimens in Comparative Anatomy preserved in the College of Surgeons—The Society leave Crane Court—Take possession of their Apartments in Somerset House—Historical Account of Somerset House—Address of Sir Joseph Banks, at the First Anniversary Meeting in Somerset House — Anniversary Dinners — Medal struck in honour of Captain Cook—Bust of Charles II. carved by Nollekens for the Society—Sir Joseph Banks' interest in the Society—The Margrave of Anspach and the Duke of Gloucester visit the Society—Sir William Herschel discovers Uranus—He receives the Copley Medal—Science of Chemistry much cultivated by the Society—Chemical Society—Meet at Chapter Coffee House—Letters from Franklin.

1780—85.

SIR JOSEPH BANKS often declared, that of all the honours which he had received, that of being elected President of the Royal Society gave him by far the greatest satisfaction. As soon as he was in office we find him taking active measures in the Council for the benefit of the Society. Shortly before the resignation of Sir John Pringle, intimation was received of the intention of Government to provide apartments for the Society in Somerset House. It was found, however, that the original design afforded such slender accommodation, that the Council addressed the following letter to Sir William Chambers, architect of the building.

"After mature consideration of the plans you had the goodness to lay before us of the apartments intended for the Royal Society at Somerset House, we beg leave, in the first place, to return you our thanks for your attention to the accommodation of the Society; and then to offer to you the following remarks.

"We think it will be a great inconvenience to have any of the apartments intended for the Royal and Antiquarian Societies, or the staircases leading to them, or to the lodging-rooms of any of their officers, in common.

"The room intended for the Society's library is much too small to contain their books. There is no room at all allowed to the Society's Museum. No room is given them on the ground-floor; one will be necessary for transacting some of the business of the Society, and another for the use of the housekeeper. We have likewise to observe with respect to the approach to the intended apartments, that there is no safe and convenient footway clear of carriages.

"We would wish to have it considered that the allotment of public apartments to the Royal Society, will be understood by all Europe, as meant to confer on them an external splendor, in some measure proportioned to the consideration in which they have been held for more than a century."

This Memorial was signed by the President and all the members of Council.

In reply, Sir William Chambers thus addressed the Council:

"Gentlemen,

"In answer to your letter, I am to acquaint you that no more space can possibly be given to the Royal Society, in the intended new buildings at Somerset House, consistent with the general plan, than that which has already been allotted: neither is it practicable to contrive any entrance-hall, principal stairs, or ante-room, suitable to the splendour of the Royal Society, but such as shall be common to the Antiquarian Society likewise. In all the other apartments of the two Societies there may be an entire separation; and I am particularly happy in being authorised to do whatever can be done within the space allotted, for the better accommodation of the Royal Society.

"In consequence of this permission, I beg leave to observe, that if the room intended for the Library be found too small, the space for books may be very considerably augmented, by dividing the room into two, one of which might occasionally serve as the Council-room, as being of a proper size and more conveniently situated, than the first designed in the attic.

"No room on the ground-floor can be contrived without reducing the hall almost to nothing, and consequently spoiling the approach to the meeting-room; but to obtain the two rooms wanted, one for some business of the Society, the other for the housekeeper, a Mezzanino may be introduced over the hall, without detriment to the interior decoration, in which they might be placed.

"These rooms, with two others in the attic, where the Council-room was first intended, with garrets over them, and the accommodations in the cellar-story, would, it is apprehended, be quite sufficient for housekeepers in general. In such case there would remain a room in the attic-floor for the Museum 42 feet long, 26 feet broad, which by comprehending the attic and garret-floors might be made 17 feet high.

"With regard to the footway to the Royal Society, it will be perfectly safe and commodious, as only the centre arch is intended for carriages, and the pavement of the side arches will be smooth and raised above the rest considerably.

"I am under the necessity of acquainting you, that a speedy determination will be necessary with regard to the points in suspense, as nothing now is wanting but your answer to carry the works into immediate execution.

"I am, &c.

"WILLIAM CHAMBERS."

The Council seriously considered this letter, and eventually resolved on accepting the offer of apartments in Somerset House, trusting to find them sufficiently capacious for the wants of the Society. In this, however, they were disappointed; for not only were the rooms insufficient in number, but their disposition was such as to present many serious inconveniences.

Under these circumstances it was determined to present the Repository to the British Museum, by which means the Society would require fewer rooms for their accommodation. It is not within the province of this work to enter into the question respecting the wisdom of this measure, which, we may observe, was, under existing circumstances, thought eligible by the Society at large.

It will be borne in mind, that, although the British Museum was not at that period what it now is, yet, it so far surpassed, in the magnitude and excellence of its collections, those belonging to the Royal Society, that the Society's Museum had long ceased to be regarded as the first in London. But we must not forget that it long enjoyed this appellation, for the British Museum was not opened until 1759; almost a century after the incorporation of the Royal Society. It is not too much to say, that the Museum, or Repository, as it was called, of the Society, must have been of great use to the man of science, and have aided materially in promoting and disseminating the knowledge of natural history.

To the last, its collections were enriched by contributions from distant countries. The Hudson's Bay Company are frequently mentioned as sending curious and valuable zoological specimens from their territories; and it is honourable to the Society to know that these contributions were not placed in the cabinets as mere matters of curiosity, but carefully examined with reference to their commercial value and importance. The accompanying letter from the Inspectors of the Society's Museum to the Hudson's Bay Company, conveys evidence to this effect. It is dated June, 1777.

"Gentlemen,

"Having endeavoured to find out whether some of the natural productions which you have been so obliging, as to present to the Royal Society, may not furnish materials for our manufactures, we take the liberty of stating to you the result of our enquiry. We have put some parts of one of the buffalo's hides into the hands of a tanner, and are informed, both by a very experienced leather-dresser and bookbinder, that it seems to be as good a material as the skin of the Russian buffalo for bookbinding. If these skins, therefore, can be procured in any quantity, the importation may answer well to the Company, and no further preparations of the hides will be necessary in Hudson's Bay, than to dry them properly with the hair on, and to take care that the sea-water does not injure them on the passage. It is supposed that each skin brought in this way to England may be worth about four shillings. We also beg leave to present to the Company, in the name of the Society, a pair of stockings made here from the hair of one of the buffalo's hides, which hung near the neck, as also a hat; but it may be proper to inform you, that the greatest part of the materials used in the latter is rabbit's hair, as that of the buffalo cannot be worked into a proper consistence for this purpose, without a mixture of some other hair. As you have presented to the Society likewise a specimen of a wild swan, we have put the skin into the hands of an importer, and we shall, perhaps, surprise when we inform you, that if it had been in a state to be properly dressed, it would have been worth at least a guinea and a half; so scarce is this commodity at present, and so great is the demand for powder-puffs, the best sort of which can only be made from swan-down. We have stated, however, that the skin sent from Hudson's Bay was absolutely spoilt by not being properly prepared, though we are informed that nothing further is necessary than the following simple process. All the feathers must be pulled off as soon as the swan is killed, leaving only the down on; after this the skin must be cut off along the back, and stripped off from the body, then take all the fat away, and turning the skin inside out, let it dry. As swan-skins therefore are so valuable an article of commerce at present, and there is a probability of procuring many of them from Hudson's Bay, it may be worth while for the Company to purchase one of them, for the more fully instructing their servants in what state they should be sent over.

"We are, &c.

"DAINES BARRINGTON,
"MARMADUKE TUNSTALL,
"WM. HUDSON."

Two years after this letter was written, the Society's Museum ceased to have a separate existence[1]. That it was of importance appears by the letter returning thanks for it, on the part of the Trustees of the British Museum.

"SIR, "*British Museum, June* 15, 1781.

"I AM directed by the Trustees of the British Museum, to acquaint you, for the information of the Royal Society, that they have received the very ample collection of natural productions which that Society has lately been pleased to present them with. You are also requested to embrace the earliest opportunity of returning their thanks to the President, Council, and Fellows of the said Society, for that considerable donation.

"I am, &c.

"J. PLANTA, *Sec^y*.

"*The Secretary Royal Society.*"

How hopeless now would be the task of attempting to find the Society's Collection amidst the interminable series of rooms composing the British Museum! Even the collection of Sloane, which in reality formed the nucleus of the national establishment, and which was a marvel in its day, is lost amongst the countless thousands of specimens which crowd the halls of the new building. It was gratifying, in the course of researches on this subject to learn, from Professor Owen, that several specimens in comparative anatomy are carefully preserved in the Museum of the Royal College of Surgeons, and duly entered in the catalogues, as having originally belonged to the Royal Society's Museum.

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[1] It is right to state, that many of the instruments are still in the possession of the Society.

It appears by the Minutes of Council, that a Committee was appointed to confer with Sir William Chambers, from time to time, on the necessary arrangements respecting the new apartments; which were sufficiently completed to receive the Society on the 30th November, 1780, on which day the Anniversary Meeting was held in them. The removal of the Society from their secluded and almost obscure residence in Crane Court, to Somerset House, was an event strongly marking the high esteem of the Sovereign for the body, and tended greatly to strengthen the reputation of George III. as a patron of science; for to him is the merit due, of having ordered a portion of Somerset House to be set apart for the high purposes of science. And it will be fitting to say a few words in this place, respecting the new building to which the Society removed.

Somerset House derives its name and origin from the Protector, Edward Seymour, Duke of Somerset, maternal uncle to Edward VI. The whole of Long Acre, with Covent Garden and its neighbourhood, belonged to this nobleman, who, desirous of possessing a residence suitable to his high rank, determined to build a palace where the present Somerset House now stands. To obtain space and building materials, he was guilty of some infringements of public and private rights, which were urged against him in the hour of adversity. An Inn of Chancery, called Strand Inn, or Chester's Inn, the episcopal houses of the Bishops of Lichfield, Coventry, Worcester, and Llandaff, and the church and church-yard of St. Mary-le-Strand, were demolished for the site of the new

Palace. To expedite the building, which was commenced in March, 1546—7, he used the materials of the demolished houses, and it is stated that with this view, he caused the chancel-house of St. Paul's, and the chapel over it, to be pulled down, as well as a large cloister on the north of St. Paul's, which contained a greater number of monuments than the church itself. Historians incline to the belief that Somerset House was never inhabited by the Protector, as his political life terminated at the close of 1549, when he was thrown into the Tower, and beheaded in January, 1552. According to the scale of a print in Strype's *Stow*, the site occupied an area of six hundred feet from east to west, by five hundred north and south. The principal architect is believed to have been John of Padua, an Italian, who was appointed 'Deviser of his Majesty's buildings in 1544.' Old Somerset House was the first building of Italian architecture executed in this country. There are several engravings of it extant. On the death of the Duke of Somerset his palace went to the crown, and King Edward VI. appears to have assigned it to his sister, the Princess Elizabeth, for her use when she visited the Court. On her accession to the throne, she always gave the preference to Whitehall and St. James's, as residences, though she occasionally visited Somerset House; and when she went to the Royal Exchange in 1570, she is stated to have come "from her house at the Strand, called Somerset House." In the reign of her successor, it became the residence of Anne of Denmark, Queen of James I. Anne made several additions to the building, from designs by Inigo Jones, and called it Denmark House, by which name it is frequently mentioned by historians of this period.

James I. dying in 1625, his body lay in state at Somerset House from the 23rd April to the 17th May. It was next occupied by Henrietta Maria, Queen of Charles I., until she left the country. The restoration brought her again to England, when she resumed her residence at Somerset House, and expended a large sum of money in putting her palace in a state of repair, and even, as Evelyn mentions, made considerable additions to it. It was on this occasion that she brought into use, for the first time in England, the mode of inlaying floors with different coloured woods. As Charles II. did not find it convenient that his Queen, Catherine of Braganza, should reside at Whitehall, the scene of his gallantries, he lodged her during some part of his reign in Somerset House. On the death of the King, it became the sole residence of Catherine, then Queen Dowager, until her return to Portugal in 1692. From that period Somerset House ceased to possess any interest in its palatial character. It still continued to be an appurtenance of successive Queens, until, on the 10th April, 1775, Parliament was recommended in a message from the Crown, to settle upon Queen Charlotte the house in which she then resided, formerly called Buckingham House, but then known by the name of the Queen's House; in which case, Somerset House, already settled upon her, should be given up and appropriated "to such uses as shall be found most useful to the public." The demolition of the old buildings was commenced as soon as an act could be passed, to carry the royal message into effect. Sir William Chambers was appointed architect, and in 1779 the new street front was completed. The other portions were finished subsequently. The site occupies an area of 800 ft. by 500 ft., being a few feet less than the area of Russell Square. The front towards the Strand consists of a rustic basement of nine arches, supporting Corinthian columns, and an attic in the centre, with a balustrade at each extremity. Emblematic figures of Ocean and the eight principal rivers of England, in alto relievo, adorn the key-stones of the arches. Statues of Justice, Truth, Valour, and Moderation, divide the attic into separate portions; the summit being crowned by the British Arms, supported by Fame and the Genius of England.

The east, west, and south sides of the edifice are entirely devoted to Government Offices, which are so numerous as to occupy, independently of the superstructure, two stories below the general level of the quadrangle. The areas are fronted by stone balustrades, and flights of stone steps lead down to the under-ground apartments and passages of communication. These are contrived with much skill, and run under the quadrangle in various directions.

In one of the passages are some interesting remains of the Old Palace, or rather of the chapel attached to it. By the marriage articles of Henrietta with Charles I., the Queen was permitted to have the full exercise of her religion, and "a chapel beautified with decent ornaments in whatever place she might reside in the King's dominions." With this license, a Chapel and a Convent of Capuchin Friars were established in Somerset House, which, as we have seen, was devoted to the Queen; and we are told, that the palace became "the very focus of Roman Catholicism[2]."

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[2] The Catholic establishment at Somerset House soon became a subject of parliamentary investigation; and it was ordered that "the sheriffs do cause the altar, and such crucifix, images, and monu-

The relics alluded to consist of five tombstones, built into the north and south walls of the passage leading under the quadrangle from east to west. By the kindness of Mr. Pollard, of the Audit Office, who gave me access to these vestiges of Old Somerset House, I am enabled to present the reader with three of the inscriptions.

The most ancient runs thus:—

CY GIST LE CORPS DE DEFVNCTE
CATHERINE GVILERMET VIVANTE
FEMME DE JEHAN BLVTEAV
POTAGÉ DE LA REYNE DE
LA GRAND BRÉTAGNE LAQVELLE
DECEDDA LE VII. MAY 1633
PRIEZ DIEV POVR SON AME.

The second in order is as follows:—

HIC JACET
DOCTOR BLASIVS
NVNES MANHANS
LVZITANVS MEDICVS
SERENESSIMÆ REGINÆ MAGNÆ
BRITANIÆ. OBIIT
DIE 21 JVLII ANNO 1673.
REQVIESCAT IN PACE.

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monuments of idolatry there, to be demolished." This was in 1642, and in the following year the Capuchins were ordered to leave the country.

The third relates to a monk, but the precise date of his decease is defaced :—

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FR. HYACINTHVS
OBIIT DIE……
169$\frac{1}{2}$
REQVIESCAT
IN PACE.

The other inscriptions were too much obliterated to enable me to transcribe them; but I have no doubt that some zealous antiquary would succeed in the task; and archæologists may be glad to know that within a few yards of the Strand lie these interesting relics of the past[3].

The terrace on the river side is raised on rustic arches. The view from hence is by far the finest on the banks of metropolitan Thames[4]. St Paul's, the

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[3] I am informed that the Mortuary Registers of the Chapel attached to old Somerset House were in the possession of the late Dr. Fryer, chaplain to the Portuguese Embassy.

[4] Some portions of Cowley's poetical description of old Somerset House hold good in the present day :—

"Before my gate a street's broad channel goes,
Which still with waves of crowding people flows;
And every day there passes by my side,
Up to its western reach, the London tide,
The spring-tides of the term; my front looks down
On all the pride and business of the town;

Tower, the Monument, and a multitude of steeples varying in elegance, and, in the beautiful language of Burke, "seeming to avert the wrath of God from the black city, full of avarice, passion, and vice," are seen to the east; while on the west, Waterloo bridge, the Abbey, and the new Houses of Parliament, present equally fine architectural views. To the south may be seen, *on clear days*, the Surrey hills. The scenery of the river is full of interest and animation. Crowded steamers flit to and fro; coasting barges with their large and picturesque ochre-coloured sails, tack from side to side, and the light wherry skims along respondent to the manly stroke of the puller. In truth, a finer locality for exercise *in London* cannot be conceived than the terrace of Somerset House, and its retirement, contrasted with the tumultuous bustle of the contiguous Strand, forms one of its most pleasing attractions[5].

My other front, (for as in Kings we see
The liveliest image of the Deity)—
My other fair and more majestick face,
(Who can the fair to more advantage place?)
For ever gazes on itself below,
In the best mirrour that the world can show;
And here, behold, in a long-bending row
How two joynt cities make one glorious bow;
The midst, the noblest place possess'd by me;
Best to be seen by all, and all o'ersee.
Which way soe'er I turn my joyful eye,
Here the great court, there the rich town, I spy.
On either side dwells safety and delight,
Wealth on the left, and power on the right."

[5] The inhabitants of Somerset House are furnished with keys to the gates of the terrace; formerly, the latter was thrown open to the public on Sundays. It was, however, found that the stonework and sculptures were so mutilated by the villainous practice

The best view of the river façade of Somerset House is from Waterloo Bridge, whence it appears truly a magnificent pile, worthy of being the abode of Sovereigns. It is visited on Sundays by hundreds of individuals, principally of the lower orders, who are, however, attracted more by one spot in the building, than by its general architectural features. During the first months of my residence in Somerset House, I was considerably surprised by invariably seeing the visitors cross the quadrangle in a straight line, and planting themselves within a convenient distance of the opposite wall, gaze eagerly upwards, pointing always to one spot which presents no architectural decoration, and, in fact, only forms part of the plain wall. Utterly unable to solve this riddle, I applied to an older resident for an explanation. He smiled at my query, and asked had I never heard of the watch. On my answering in the negative, he told me the following traditionary story. When the wall, to which I have alluded, was being built, a workman had the misfortune to fall from the scaffolding, and was arrested in his descent by his watch-chain catching some portion of it. Thus wonderfully preserved, his gratitude led him (he must have been a Milesian) to insert his watch into the face of the wall, as a memento of his escape. So runs the story; how traditionary in its origin, may be judged by the fact, that the watch-face was placed in its present situation, some years ago, by the Royal Society, as a meri-

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of carving names, that it became necessary to keep the gates locked on this, as well as on other days. I once caught a young vagabond cutting his name deep on the nose of one of the magnificent lions!

dian mark for a portable transit instrument in one of the windows of the ante-room[6].

One of the earliest purposes to which new Somerset House was applied, was for the exhibition of paintings by the Royal Academy; to whom were allotted apartments in the west portion of that part of the building towards the Strand, which are now devoted to the School of Design, and the University of London. The Royal Academicians appear to have been highly pleased with this mark of their Sovereign's favour. At their festival an appropriate ode was sung, which, however, is more remarkable for its loyalty than poetic merit, as the following verse testifies :—

"Let Science hail this happy year,
Let Fame its rising glories sing;
When Arts unwonted lustre wear,
And boasts a patron in their King:
And here unrivall'd shall they reign,
For George protects the polish'd train."

The first public exhibition was opened on the 1st May, 1780[7]. On the 30th November, in the same year, the Royal Society, as has been stated, held their Anniversary in their new Meeting-room, a representation of which is annexed; on which occasion Sir Joseph Banks, in his capacity of President, opened his address by an allusion to the sentiments awakened by the removal :—

"The emotions," he said, "of gratitude inspired by the very place in which, by the munificence of our Royal Patron, we are now for the first time assembled, render it impossible for me to neglect the opportunity which this season, when ye have been used to hear yourselves addressed from the chair, affords me, of offering my small tribute of acknowledgment for a benefit so eminently calculated to promote the honour and advancement of this Society. Established originally by the munificence of a Royal Founder; fostered and encouraged since that time by every successive Monarch who has swayed the British Sceptre, ye have ever proved yourselves worthy the favour of your Royal Protectors. A Newton who plumed his infant wing under your auspices, when his maturer flights soared to worlds unmeasurably distant, still thought a place among you an honourable distinction. A Newton's immortal labors, a Boyle, a Flamsteed, a Halley, a Ray, and many others, of whom I trust it is needless to remind you, have made ample returns for the patronage of former Monarchs.

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[6] Captain Smyth informs me that he assisted in mounting this instrument, and perfectly recollects seeing the watch-face placed against the opposite wall.

[7] The Academy removed to Trafalgar Square in 1836.

"But, bountiful as the encouragement ye have received from former Patrons has ever been, the favors which science has through your intercession received from his present Majesty (whom God long preserve), have eminently outdone their most extensive ideas of liberality. Ample funds, by Him provided, have enabled you to reward men of extensive knowledge and ability, for spending whole years in the service of science; observing twice the transit of the planet Venus over the disc of the Sun. At your request, the public defrayed the expense of conveying them to the most distant parts of the globe we inhabit, where the purposes of their mission, so important to the science of Astronomy, could best be fulfilled; while ye alone enjoy, among your fellow Academies, the reputation of having both sent and rewarded them. And more; those very donations were so liberally planned by that attention to science which has ever distinguished his present Majesty's reign, and will for ever bear testimony of his enlarged mind, and disposition favourable to the advancement of true knowledge; that the surplus alone enabled you, with his Royal approbation, to institute experiments on the attraction of mountains, amidst the barren and bleak precipices of the highlands of Scotland; which then, for the first time, beheld instruments of the nicest construction transported to the summits of their pathless crags, and men used to other habitations voluntarily residing in temporary huts, eager to express a grateful sense of their Royal Patron's liberality, by thus promoting to the utmost the cause of science, in which they were under his protection embarked. Gifts like these, unsolicited and unconditionally bestowed, might have satisfied the impulses even of a Princely Munificence; but not so with our Royal Patron. Amply informed in every branch of real knowledge, he resolved to bestow a still more distinguished mark of his favor on science which he loved, and in this his last best gift has fulfilled his Royal resolution. Such a donation, so suited to our present prosperous and flourishing condition under his Royal patronage and protection, is admirably calculated to increase the respect, great as it is, which ye have ever received from the learned of all Europe; placing you at once, in every point of splendid accommodation, as much above all foreign Academies, as the labours of your learned predecessors had raised you above them in literary reputation. Let then gratitude to a Sovereign from whom ye have received such conspicuous encouragement, engage you, by an application to a promotion of the sciences ye severally possess, to deserve a continuance of his Royal favor; to measure your future exertions by the standard of his princely liberality; and thus shew the world, that ye still are, as ye always have been, worthy the Patronage of your King."

After the election of officers and Council, the Society dined together at the Crown and Anchor: where, if the more sober pursuits of philosophy did not lead to an outpouring of loyalty in the form of an ode, the Fellows assembled were not behind the Royal Academicians in grateful expressions of thanks for the King's favour.

There is a small Manuscript book in the Society's Library, giving the names of the Fellows present at the Anniversary dinners from 1768, to 1809. From this it appears that from 1768, to 1771, inclusive, they dined in the Middle-Temple Hall; in 1772, at the Mitre Tavern, and afterwards at the Crown and Anchor, in the Strand, where the Society continued to hold their Anniversary Dinner until 1848, when the tavern was sold to the Whittington Club[8]. The average attendance on those occasions, during the above years, was 70.

In the middle of 1779, the melancholy intelligence reached England, of the massacre of Captain Cook. The death of this gallant officer was a greater loss to science than to the profession which he adorned; and thus, it will easily be understood, that the Royal Society could not lose such a member of their body without being anxious to honour his name and memory by a particular mark of respect. Sir Joseph

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[8] The Freemason's Tavern, in Great Queen Street, has been selected for the future celebration of the Anniversary Dinner.

Banks, in his capacity of President, brought the subject soon afterwards before the Council; and, on the 20th January, 1780, the subjoined Resolution appears on the Minutes of Council:—

"Resolved, that it is the opinion of the Council, that the very signal services performed by the late Captain Cook, a worthy Member of this Society, in the many and extensive discoveries he has made in different parts of the globe merit some public act on the part of the Society, as a mark of the high sense they entertain of the importance of those services, and to testify their zeal for perpetuating the memory of so valuable and eminent a man."

At the next Meeting of Council on the 27th January, it was resolved:—

"That it appears to the Council, that the most effectual method of accomplishing their views with respect to Captain Cook, as stated in the Minutes of their last Meeting, is that the Society order a medal to be struck expressive of his deserts. But, that as the expense of striking a proper medal would fall too heavy upon the funds of the Corporation, it be proposed to the Society, that a voluntary subscription be opened to the Members thereof, and them only, towards assisting the said Corporation in that expense."

At the ensuing Meeting of Council the following resolution was passed:—

"That a subscription be opened to the Members of the Society, for raising a fund towards assisting the Corporation in defraying the expense of the medal that is intended to be struck in honour of Captain Cook.

"That all such Members, as shall subscribe the sum of twenty guineas, shall be entitled to one gold medal, and those who shall subscribe one guinea, shall receive either one silver or two bronze medals, and that the same return shall be made for every additional subscription *toties quoties.* That besides the medals thus subscribed for, every Member of the Society shall be entitled to one bronze medal."

These resolutions met with the approbation of the Society, and a book was forthwith opened, to receive the names of Fellows desirous of subscribing for the medal. In looking over some old Papers in the Archives, I was so fortunate as to find a number of interesting documents relating to Captain Cook's medal, which are now bound, and safely deposited in the Library. From these papers it appears, that the principal artists of the day sent in designs for the medal; these form part of the papers in question. Some of the designs are elegant and appropriate; they amount to twenty; besides various mottoes and devices. The design by Lewis Pingo was eventually adopted. It bears on one side the head of Captain Cook, in profile, and round it, IAC. COOK, OCEANI INVESTIGATOR ACERRIMVS; and on the exergue, *Reg. Soc. Lond. Socio svo.* On the reverse is a representation of Britannia, pointing to the south pole of a globe. Round her is inscribed, NIL INTENTATVM NOSTRI LIQVERE, and on the exergue, *Auspiciis Georgii III.* Mr. Pingo was paid 84*l.* for two dies; and the medals were struck at 6*l.* 18*s.* for those in gold; 11*s.* for silver; and 5*s.* for copper: 274 silver and 9 gold medals were subscribed for, and the following numbers were struck: 13 gold, 289 silver, and 500 bronze. Five gold medals were struck for the purpose of presentation; one of these was presented to the King, one to the Queen, one to the Prince of Wales, one to the King of France, who expressed his satisfaction in a very complimentary letter to the Society, signed by himself, and countersigned by the Marquis de Vergennes, and one to the Empress of Russia, who ordered the Medal to be deposited in the Museum of the Imperial Academy of Sciences, and in return presented the Society with a large and beautiful gold medal bearing her portrait on one side, and on the reverse, a representation of the statue of Peter the Great.

After the general assignment of the medals, which took place in the early part of 1784, it was found that after paying all expenses, a surplus of money remained, upon which it was resolved, "That a sufficient number of gold medals should be struck to be disposed of as presents, to the Earl of Sandwich, Dr. Franklin, Mrs. Cook, Dr. Cook, and Mr. Planta. Copies are appended of the letters, addressed by Sir Joseph Banks to the three first-named individuals.

"My Lord,

"I am happy in fulfilling the instructions of the Council of the Royal Society, by requesting your Lordship to accept from them, their gold medal of Captain Cook, as a testimony of the grateful sense they entertain of the effectual and unwearied patronage by which your Lordship enabled that great Navigator to execute those voyages, by the success of which this country has received such essential service, and increased her reputation above her naval rivals; as also in proof of their sincere approbation of the elegant manner in which the accounts of his voyages have been ornamented at the public expense by your Lordship's orders, which are rendered thereby monuments worthy the actions they record, and the gratitude of a liberal and powerful nation.

"I am, &c.

"*Earl of Sandwich.*" "JOSEPH BANKS.

The next letter is addressed to Dr. Franklin:—

"DEAR SIR, "*Soho Square, Aug.* 13. 1784.

"WILLING as much as is in my power to clear the Royal Society and myself from our share of the charge of illiberal treatment towards you, with which I fear this country may too justly be accused, I take my pen with no small pleasure to inform you, that I am instructed by the Council of the Royal Society, to present to you, in their name, the gold medal which they have struck in honour of Captain Cook, in testimony how truly they respect those liberal sentiments which induced you, upon his return to Europe unexpected, to issue your orders to such American cruisers as were then under your direction, to abstain from molesting that great navigator; an act worthy those sentiments of general philanthropy by which I have observed your conduct ever actuated since I have had the honour of your acquaintance. At the same time, give me leave to congratulate you on the honourable manner in which you received a copy of Captain Cook's *Voyages*, sent by his Britannic Majesty, as a testimony of his Royal approbation of the same liberal conduct. As I suppose you would wish to know to whom you are obliged for the representation which induced his Majesty to send it, I can inform you that though I, who by desire of the Admiralty conducted the general business of that publication, when I reported to them the names of those to whom I thought it right presents of the work ought to be made, did not venture to insert your name among them; Lord Howe, on hearing my reasons why one should be sent to his M.C.M., approved in warm terms of the idea, and acquainted Lord Sandwich that you had an equal claim to that compliment; on which his Lordship, without the least hesitation, resolved to ask his Majesty's leave to send a copy to you in his Royal name, and as easily obtained it.

"I am, &c.

"*Dr. Franklin.*" "JOSEPH BANKS.

Sir Joseph's letter to Mrs. Cook was as follows:—

"MADAM, "*Soho Square*, 12 *Aug.* 1784.

"BY the directions of the Council of the Royal Society, I request you to accept from them a medal in gold, struck in honour of your late husband Captain Cook, and in consideration of the many services he did to the cause of science.

"As his friend, I join to yours, my sincere regret for the loss this nation has suffered in the death of so valuable a man; and that which the Royal Society feels in so useful a member; but while we lament his loss with a tear of real affliction, we must not forget that his well-spent life secures to us who survive him, that best consolation, the recollection that his name will live for ever in the remembrance of a people, grateful for the services his labours have afforded to mankind in general.

"Cease then, Madam, to lament a man whose virtues have exacted a tribute of regret from a large portion of the natives of the earth; and let your best affections continue the task they have hitherto so well fulfilled, of training up his son in the paths of virtue and honour; that, under the influence of his Father's example, he will emulate, at least, and perhaps attain, as great a share of well-earned reputation, as his Father left behind, to dry the tears of us who survive him.

"I am, &c.

"*Mrs. Cook.*" "Joseph Banks.

Mrs. Cook's reply is sufficiently interesting to be inserted:—

"Sir, "*Mile End, August* 16, 1784.

"I received your exceeding kind letter of the 12 Inst., and want words to express in any adequate degree my feelings on the very singular honour which you, Sir, and the honourable and learned Society over which you so worthily preside, have been pleased to confer on my late husband, and, through him, on me and his children, who are left to lament the loss of him, and be the receivers of those most noble marks of approbation, which, if Providence had been pleased to permit him to receive, would have rendered me happy indeed.

"Be assured, Sir, that however unequal I may be to the task of expressing it, I feel as I ought the high honour which the Royal Society has been pleased to do me. My greatest pleasure now remaining is in my sons, who I hope will ever strive to copy after so good an example; and, animated by the honours bestowed on their Father's memory, be ambitious of attaining by their own merit your notice and approbation. Let me entreat you to add to the many acts of friendship which I have already received at your hands, that of expressing my gratitude and thanks to that learned body in such a manner as may be acceptable to them.

"I am, &c.

"*Sir Joseph Banks, Bart.*" "Eliz. Cook.

It may be mentioned here, that in May, 1835, Mrs. Cook, feeling her end approaching, presented the gold medal which she had received from the Society, as well as the Copley Medal awarded to her husband, to the British Museum, where they are preserved. She died shortly after.

The preceding details respecting Captain Cook's medal have carried us a little in advance of our time. In 1780, at Sir Joseph Banks' suggestion, the Council ordered Nollekens to make a new bust of the Founder, Charles II., for which the Society paid 73*l.* 10*s.* This bust now stands behind the President's chair in the Meeting-room. It was also at Sir Joseph's desire, that two large arm-chairs, richly gilt, were provided for distinguished visitors to the Society.

This circumstance, of apparent unimportance, was subsequently brought forward as a serious charge against the President. The hour of the ordinary Meeting was altered from 6 to 8 o'clock; and, for the first time, the titles of Fellows were appended to their names in the list, which at this period used to be printed on a large sheet. In all departments, Sir Joseph appears to have manifested great energy, entering also into the details of the Society's business with extraordinary zeal. Of this we have a striking instance. A certain nobleman died largely indebted to the Society for his subscription, which he had not paid for many years, although repeated applications had been made to him. On his son's succession to his deceased father's estates and title, Sir Joseph addressed him in the following terms[9] :—

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[9] It was Sir Joseph Banks' custom to make a copy of his letters, on a slip of paper of the size used for botanical nomenclature.

"My Lord, "*Soho Square, March* 18, 17—.

"I take the liberty of an old schoolfellow, of writing to your Lordship, and at the same time fulfil a necessary duty to the Royal Society, by informing you that your late Father died indebted to that body (—*l.*), having omitted for some years to pay his contributions of 2*l.* 12*s.* a-year towards its support. As I conclude your Lordship is ignorant of that circumstance, and that you would wish to liquidate a debt of that nature speedily, I make no other apology for this trouble.

"I am, &c.

"*The Earl of* ——" "Joseph Banks.

This diplomatic letter produced the desired effect. Lord ——'s answer enclosed a cheque for the debt; and is couched in terms of friendship to Sir Joseph Banks. But the latter did not allow the affair to drop here, for he thus acknowledged the receipt of his lordship's letter:—

"My Lord, "*Soho Square, March* 20, 17—.

"Your Lordship's honourable conduct relative to the debt owing to the Royal Society, I shall not fail to report to that body, who will, I am sure, receive as they ought this mark of your Lordship's attention to justice.

"I shall not fail to pay my personal respects in ——, as soon as it is in my power, to thank your Lordship for your polite remembrance of your old schoolfellow.

"I am, &c.

"*The Earl of* ——" "Joseph Banks.

These copies are frequently preserved with the answers to his letters. This is the case with respect to the above letter.

Such was the solicitude shown by the President in the affairs of the Society. In 1780, H. R. H. the Duke of Gloucester, and his Serene Highness the Margrave of Anspach, were elected Fellows of the Society. Under the date of the 10th February, in the above year, the Journal-book states: "At a quarter before seven, notice was brought that H. R. H. the Duke of Gloucester, and his S. H. the Margrave of Anspach, were arrived at the house of the Society, upon which the President quitted the chair, and being preceded by the Mace, went to receive them at the top of the stairs; having introduced them into the Meeting-room, he resumed the chair, and their Highnesses were seated at his right hand."

In 1781 the Society acquired additional renown, from the discovery of a new planet by Sir William Herschel, F.R.S., who, on Tuesday the 13th March, between 10 and 11 at night, while engaged in the telescopic comparison of a large number of stars, "perceived one that appeared visibly larger than the rest: being struck with its uncommon magnitude, I compared it," (says Sir William) "to η Geminorum and the small star in the quartile between Auriga and Gemini, and finding it so much larger than either of them, suspected it to be a comet[10]." As soon as a sufficient number of observations were obtained, it was found that the supposed comet was a planet, which the discoverer named Georgium Sidus, in honour of the reigning king[11], but which, at the proposal of Bode, was eventually called Uranus. Mr. De Morgan almost prophetically writes, "This name is appropriate, inasmuch as Uranus is the father of

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[10] *Phil. Trans.*, Vol. LXXI. p. 492. The discovery was communicated to the Society on the 26th April.

[11] A letter from Herschel to Sir J. Banks, was read to the Society on the 7th Nov., 1782, giving his reasons for calling it *Georgium Sidus*. In it he says: "During the fabulous ages of

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ancient times the appellations of Mercury, Venus, Mars, Jupiter, and Saturn, were given to the Planets as being the names of their principal heroes and divinities. But in the present more philosophical era, it would hardly be allowable to have recourse to the same method, and call on Juno, Pallas, Apollo, or Minerva for a name to our new heavenly body. The first consideration in any particular event, or remarkable incident, seems to be its chronology: if in any future age it should be asked, *when* this last-found Planet was discovered? It would be a very satisfactory answer to say, "In the reign of King George the Third." As a philosopher, then, the name of Georgium Sidus presents itself to me, as an appellation which will conveniently convey the information of the time and country, where and when it was brought to view. But as a subject of the best of Kings, who is the liberal protector of every art and science;—as a native of the country from whence this illustrious family was called to the British Throne:—as a member of that Society, which flourishes by the distinguished liberality of its Royal Patron;—and, last of all, as a person now more immediately under the protection of this excellent Monarch, and owing everything to his unlimited bounty;—I cannot but wish to take this opportunity of expressing my sense of gratitude by giving the name Georgium Sidus,

> — *Georgium Sidus*
> —*jam nunc assuesce vocari.* Virg. *Georg.*

to a star, which (with respect to us) first began to shine under his auspicious reign." Journal-book, Vol. xxxi. p. 211.

It is curious, that whereas we see that Sir W. Herschel was desirous of abandoning mythological nomenclature; his son, the present Sir John, and other astronomers, advocate recurring to mythology as neutral ground. Captain Smyth observes:—The recent consecrations of flattery, as *Scutum Sobieskii*, *Honores Frederici*, *Taurus Poniatowski*, *Cor Caroli*, *Robur Caroli*, *Sceptrum Brandenburgicum*, *Harpa Georgii*, and the like; together with every political, national, and worldly-interested allusions, should be at once swept away. So also should be treated the *Sextant*, the *Printing Press*, the *Painter's Easel*, the *Sculptor's Apparatus*, the *Mariner's Compass*, Saturn, in mythology, as Saturn is of Jupiter, and Jupiter of Mars; but what will be done if a new planet should be discovered still more distant than Uranus?" A new planet has been discovered by two master minds, independently of each other, in a manner which renders the discovery of Uranus deeply interesting.

A reference to old catalogues showed that "Uranus had been seen and noted as a star five times by Flamsteed, once by Bradley, once by Mayer, and twelve times by Lemonnier; the last of whom (says Arago) must have been the discoverer of the planet, if he had only arranged his observations so as to look at all those of the same star at once."

The Copley Medal was awarded to Sir William Herschel at the Anniversary in 1781; on which occasion Sir Joseph Banks thus addressed the astronomer:—

"In the name of the Royal Society I present to you this gold medal, the reward which they have assigned to your successful labours, and I exhort you to continue diligently to cultivate those fields of science which have produced to you a harvest of so much honour. Your attention to the improvement of Telescopes has already

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the *Log and Line*, and other unnatural intrusions into the starry heavens, which, with all the pretensions of the moderns, are just as inapplicable as the grotesque chimeras of the ancients. Indeed, "it is to mythology," says Sir John Herschel, "and to classic antiquity that I should be disposed to retreat, as to a neutral ground, on which to escape from vexatious and interminable discussions on this head." The view is correct: those who would sweep away the constellations altogether as incongruous absurdities, or wicked pagan allusions, seem rather reckless about the consequences of such a measure on astronomical history, chronology, and extra-observatorial practice."—*Cycle of Celestial Objects*, Vol. I. p. 437.

amply repaid the labour which you have bestowed upon them; but the treasures of the heavens are well known to be inexhaustible: who can say but your new Star, which exceeds Saturn so much in its distance from the Sun, may exceed him as much in magnificence of attendance? who knows what new rings, new satellites, or what other nameless and numberless phenomena remain behind, waiting to reward future industry and improvement[12]?"

Judging by the number of communications on subjects connected with chemistry, made to the Society in 1780, 1781, and 1782, this science appears to have been much cultivated at that period by the Fellows, and a Chemical Society, composed of the leading chemists, was formed. The late Professor Playfair says, in his *Journal*, under the date of 1781, "Chemistry is the rage in London at present[13]. I was introduced by Mr. B. Vaughan to a Chemical Society, which meets once a fortnight in the Chapter Coffee-House. Here I met Mr Whitehurst, a venerable old man, author of *An Inquiry into the Formation of the Earth*, Dr. Keir, Dr. Craufurd, and several others. The conversation was purely chemical, and turned on Bergmann's experiments on iron[14]."

It was probably to this club that Franklin alludes in a letter to Mr. Price, written from Passy, in 1781:—

"Please," he writes, "to present my affectionate respects to that honest, sensible, and intelligent Society, who did me the honour of admitting me to share in their instructive conversations. I never think of the hours I so happily spent in that company, without regretting that they are never to be repeated; for I see no prospect of an end to this unhappy war in my time. Dr. Priestley, you tell me, continues his experiments with great success."

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[12] Journal-book, Vol. xxx. p. 634.

[13] Dr. Thomson observes: "There is no other work that contains so rich a collection of chemical papers as the *Philosophical Transactions*." *History of the Royal Society*, p. 505.

[14] *Works*, Appendix, p. 85.

Though not strictly applicable to the subject under discussion, the following extract from another letter of the Doctor's, of nearly the same date, embodies so much of his largeness of views, and is so prophetic in spirit, that it is worthy of insertion in this place. The letter is addressed to Priestley:—

"I always rejoice to hear of your being still employed in experimental researches into Nature, and of the success you meet with. The rapid progress *true* science now makes, occasions my regretting sometimes that I was born so soon. It is impossible to imagine the height to which may be carried, in a thousand years, the power of man over matter. We may, perhaps, learn to deprive large masses of their gravity, and give them absolute levity, for the sake of easy transport. Agriculture may diminish its labour and double its produce; all diseases may by some means be prevented or cured, not excepting even that of old age, and our lives lengthened at pleasure even beyond the antediluvian standard."

This gives us a reflective view of the progress of science at this period amongst the Fellows of the Society, which the American philosopher contributed to advance; for, although living in France, we find him occasionally transmitting papers for insertion in the *Philosophical Transactions*.

CHAPTER VI.

Dissensions in the Society—Determination of Sir Joseph Banks to watch over the Election of Fellows—Causes him to be unpopular—The Council conceive the Duties of the Foreign Secretary to have been neglected—Dr. Hutton resigns that office—Thanks voted to him by the Society—Dr. Hutton's Defence—Party against the President—Dr. Horsley becomes Leader of the Opposition—Large Meeting of the Society—Resolution in favour of the President—Temporary cessation of Dissensions—Present of a Pamphlet against the Society—Sir Joseph Banks refuses to propose the usual Thanks of the Society to the Donor—Dr. Horsley moves that Thanks be given—Mr. Maty alone supports his Motion—Several Members take part in the Debate—Mr. Maty (Secretary) resigns—Dr. Blagden appointed his Successor, in opposition to Dr. Hutton—Restoration of Tranquillity—Anniversary Address of President—Controversy respecting the Discovery of the Composition of Water.

1780—85.

IT is painful to turn from the events recorded in the preceding Chapter, so honourable to philosophers, to the years 1783, and 1784, when dissensions turned the hall of science into an arena of angry debate, to the great and manifest detriment of the Society. It would be far more agreeable to pass over this period in silence, but duty forbids. I shall therefore proceed to give a succinct and impartial account of the various circumstances relating to this stormy period, endeavouring to act upon the wholesome maxim, *Audi alteram partem.*

We have seen that Sir Joseph Banks was exceedingly active in all that concerned the internal affairs of the Society. He did not, however, stop here, but, conscious of the importance of the body over which he presided, and of the necessity that existed to maintain their dignity, he early took measures to render the Fellowship more difficult of attainment, than it was at the time of his election. The Secretaries, there is reason to believe, had the power of electing any candidate who was ambitious of becoming a Fellow of the Society, and the President, whose duty it clearly is to preserve the purity of election, was seldom consulted. "It is well known," says a writer in Tilloch's *Magazine*, "that D'Alembert, in allusion to the extreme prodigality with which the honours of the Fellowship were distributed, was in use to ask jocularly any person going to England, if he desired to be made a Member, as he could easily obtain it for him, should he think it any honour." An examination of the Journal-books for the purpose of ascertaining the number of Fellows elected during the five years prior and posterior to the period of Sir Joseph Banks' election to the Presidency, makes it appear that there were fewer candidates elected during the former, than the latter period. The numbers stand thus:—

1774	26	1779	32
1775	23	1780	21
1776	28	1781	32
1777	24	1782	14
1778	26	1783	31
	127		130

So that, during the first five years of Sir Joseph's Presidency, 130 candidates were elected, while during the preceding five years only 127 were elected. It cannot, therefore, be said that the President closed the doors of the Society against candidates. He did not do this, but he investigated their claims and qualifications. Upon this subject Lord Brougham says: "Two principles were laid down by him; first, that any person who had successfully cultivated science, especially by original investigations, should be admitted, whatever might be his rank or his fortune; secondly, that men of wealth, or station, disposed to promote, adorn, and patronize science, should, but with due caution and deliberation, be allowed to enter. He announced to the Secretaries and Members, his determination to watch over the applications for admission, and the election by ballot. Previous to the election, he spoke to the Members who usually attended; he gave his opinion freely on the merits of candidates, and when he considered a rejection proper, he hesitated not to advise it; giving his opinion, and recommending, or asking a black-ball from individuals at the time of the ballot[1]."

The following letter, which Sir Benjamin Brodie has been so kind as to communicate to me, throws additional light on Sir Joseph Banks' ideas respecting the admission of Fellows into the Society:—

"14 *Saville Row, April* 7, 1848.

"MY DEAR SIR,

"THE view which Sir Joseph Banks took of the construction of the Royal Society was, that it shall consist of two classes:—the working men of science, and those who, from their position in society or fortune, it might be desirable to retain as patrons of science. Sir Everard Home wished to propose Dr. Vaughan, (who was then in *very large* practice as a metropolitan physician) as a Fellow of the Society, but Sir Joseph would not agree to it. He said he would not allow a gentleman to be qualified for admission into the Society merely because he was a fashionable physician. After some years Dr. Vaughan inherited a fortune, and became Sir Henry Halford. Sir Joseph then said that he might now be admitted as belonging to the other class. Sir Henry was accordingly elected.

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[1] *Lives of Men of Science*, Vol. II. p. 364.

"Sir Everard Home at another time asked Sir Joseph's consent to his proposing Dr. Warren as a Fellow: but Sir Joseph gave the same answer. Dr. Warren was afterwards elected a Fellow with Sir Joseph's concurrence, as being a member of the Animal-Chemistry Society.

"I am, &c.

"*C. R. Weld, Esq.*" "B. C. BRODIE.

Mr. Brown and others have assured me, that Fellows scarcely ever thought of bringing forward a candidate, until he had been introduced to the President, and was approved by him[2]. Such a mode of proceeding could hardly fail to create enemies, and when we add, that certain candidates, disapproved by the President, were rejected, it will easily be understood that his measures jeopardized his popularity[3].

It was not, however, until 1783, that the flames burst forth, although the fire had long been smouldering. The facts were these. In January, 1779, Dr. Charles Hutton, Professor of Mathematics at the Royal Military Academy of Woolwich, was elected Foreign Secretary. His professorial duties necessarily obliged him to live at Woolwich, and from this circumstance, complaints were made of his not attending sufficiently to his duties at the Royal Society. It may be proper to state, that although Dr. Hutton retained the office of Foreign Secretary, he was on the Council only two years, viz. from the Anniversary in 1778 to that in 1780. During this period twenty-five Councils were held, and Dr. Hutton was absent on four occasions only. In the Council-Minutes of January 24, 1782, the following entry occurs :—

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[2] The Candidate was generally presented to Sir Joseph, at one of his Thursday morning breakfasts, and if unobjectionable, was introduced to the influential and leading Fellows, at the Club Dinner.

[3] From the period of Sir Joseph's election as President, until March 1784, eleven Candidates were rejected.

> "It having been represented to the Council that the Foreign Correspondence was not carried on with sufficient punctuality, and the emolument of the Foreign Secretary, who is now charged with the said correspondence, is by no means adequate to the duties of his office; it was proposed by the President, that for the future the articles of his duty relating to the translation of papers and the extracting of foreign books be dispensed with. The Council agreed to this proposal, and it was 'Resolved, that a Committee be appointed to determine accurately the duties of the Foreign Secretary.'"

A Committee was accordingly formed, consisting of the President, Mr. Pownall, Dr. Blagden, and the two Secretaries. They delivered their Report on the 7th February, to the effect :—1. That the Foreign Secretary apprise foreigners of their election as foreign Members. 2. That he return foreigners thanks for presents. 3. That he answer all letters from foreigners, as also write such letters to foreigners as the President or Council shall direct. This Report was adopted, and Dr. Hutton having been directed to attend the Council on the 25th April, agreed to retain the office of Foreign Secretary, on the foregoing conditions. On the 6th June, he was ordered to send letters of thanks to foreigners for presents received during the preceding year, which had not been done. No other entry occurs respecting Dr. Hutton until the 20th November, 1783, when, at a full Meeting of Council, it was resolved by ballot, "that it is the opinion of the Council that it would be for the benefit of the Society, that the business of the Foreign Secretary be done by a person constantly residing in London." On the 17th December, the Council, at another Meeting, approved this resolution, and the President stated Dr. Hutton had resigned: "The question being put, whether this resignation be accepted, it was by ballot determined in the affirmative[4]."

As soon as these facts became known, great dissatisfaction was expressed by a considerable number of the Fellows, which was increased by Dr. Maskelyne's exclusion from the list of the new Council, proposed for election at the Anniversary in 1783[5]. And on the 11th of December, 1783, Mr. Poore moved at the ordinary Meeting, "that the thanks of the Society be given to Dr. Hutton, for his services as Secretary of Foreign Correspondence."

The President opposed this proposition, on the ground that it was impossible for the Society, as a body, to know whether the duties of Foreign Secretary had been efficiently performed or not; and further declared, that "he, who did know what Dr. Hutton's conduct had been in office, was of opinion that he had neglected the duties of it[6]." An animated discussion ensued, which terminated by an amendment being moved, "whether the main question of returning thanks be put to the vote or not." This was carried in the affirmative, there being 33 voices to 28. The original motion was then put and carried, "there being 30 affirmatives and 25 negatives." The President accordingly returned thanks to Dr. Hutton. At the next ordinary Meeting, on the 18th December, Dr. Hutton gave in the following Defence, which was read by the Secretary:—

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[4] There were only two dissentients—Dr. Maskelyne and the Rev. P. Maty, both friends of Dr. Hutton.

[5] It is probable that Dr. Maskelyne only went out by rotation, as he was elected into the Council a few years after this date.

"DR. HUTTON'S DEFENCE[7].

"As to the duties of the second agreement, made February 1782, I have regularly fulfilled them all as far as there was ever any occasion offered, by returning thanks for all foreign presents received, and prepared answers to all the letters I ever received, and sent them to be laid before the Council too, according to article 3rd of the agreement. And the reason why no answers are entered in a book as required by that article, is as follows: In the first place, then, I never received any but three letters; I know of no more; and these were given to me by the Clerk, who said he had them from the Secretary to deliver to me. Now the first two of these three were given me at the same time, being as it were but one letter, written at the same time by the same party; it was from the College of Cambridge in the American States, consisting of two parts; the one part was only to return thanks to the

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[6] *Appeal to the Fellows*, &c., p. 16.

[7] This is not entered in the Journal-book.

Royal Society for a present of the Astronomer-Royal's printed book of Observations, and the other part was to announce a paper of Astronomical Observations sent at the same time from the College to the Society. Now as the first of these two parts could require little or no answer, I delayed answering them until their paper of Observations should pass the Society and Council, that I might be able to inform the College as to the fate of it, whether it was to be printed, or not; and I asked Dr. Maskelyne, from time to time, if it had passed the Council, which, as soon as I knew of, and had provided the means of transmitting my answer to the College through the hands of a friend at New York, (for we were then at war with America), I prepared my answer, and sent it by the Clerk to be laid before Council for their approbation, with the original letter to which it was an answer. The Clerk accordingly delivered it to Mr. Planta in Council for that purpose; but he, without laying my answer before the Council, returned it to the Clerk to give it me back again, saying, that it did not signify now, as he himself had answered it. So much then for the answer to the twin letter. The only other letter that was given to me, was also by the Clerk, who said he had it from the Secretary to give me: I asked the Clerk if he knew for what purpose it was delivered to me, as it was only a letter to announce a present (from a Mr. Gual, or some such name) sent to the Secretary, and seemed required only a common letter of thanks, as in the 2nd article of the agreement; but he said he knew not, as he was only told to deliver it to me. I then asked Mr. Planta about it, and he informed me it only required a common letter of thanks for the present; and which letter of thanks I accordingly wrote and sent like as all the rest, and which therefore was not a letter to be entered in a book as per 3rd article of agreement. Hence then it appears, there can no answer appear as entered in a book, since the only (twin) one I was prevented from answering, and my answer never laid before the Council. I am therefore clearly not culpable by any breach of duty. But if even something of this kind had been the case; if I had been dilatory in some part; or if I had delayed or neglected some answers to letters, &c., might I not have expected to have been reminded of it by the President, or by some person for him, to have quickened my application, or to have given me occasion to clear up the matter, that there might be no misunderstanding, before a vote of censure should be passed on me, amounting to a disgrace from my office, unheard, and without the knowledge of any suspicion, of any neglect, or offence given? And for this purpose the President had opportunities enow given him to speak to me about that or any other business, as I purposely have constantly attended at least every other public Meeting of the Society, and very often every Meeting, to the great neglect of my many other important concerns. And these frequent attendances in town, where I have commonly remained for three days each time I came, have obliged me to keep apartments in town, the expenses of which have always cost me more than double the salary I received for the discharge of my office. But notwithstanding all these opportunities, since the last agreement in February 1782, the President has never since opened his mouth to me on the subject of my office, nor ever sent me any message concerning it[8]."

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[8] *Authentic Narrative of the Dissensions and Debates in the Royal Society.*

On the conclusion of this defence, a motion was made by Mr. Pownall, and seconded by Mr. Glenie, "That if Dr. Hutton hath been in the opinion of any Member of the Society criminated, it is the opinion of the Society that he hath fully justified himself." This was carried by a majority of 30, there being 45 for, and 15 against it[9]." Here, it might be imagined, the affair would have ended. On the one hand, Dr. Hutton, who, unfortunately, had not given satisfaction to the President and Council, had resigned, and on the other, the Fellows had carried their motions of thanks and exoneration. But deeper feelings were at work; for Dr. Horsley, afterwards Bishop of St. Asaph, is reported to have stated, in one of his speeches upon the 18th December, "that the Society was in circumstances which rendered debate necessary to its preservation; that its chartered rights had been infringed; the freedom of its elections controlled; the business of the Committee of Papers mismanaged: that he had charges to bring forward, which might keep the Society in debate the whole winter; especially if upon every occasion of debate, it was first to be debated whether the company should debate or not:—perhaps beyond the winter; perhaps till the season should return for the President to inculcate his annual admonition from the chair, which it was to be hoped would never be again, what it had too long been, a nugatory form[10]; his admonition to the Members to think of proper persons to be chosen into the Council, and to fill his own and the other offices." Dr. Horsley did not stand alone; he was supported by Dr. Maskelyne and Mr. Maseres, who materially assisted in fanning the flames of discontent. These three gentlemen, it is recorded, took for their ground of opposition, the alleged affront given to them and the physical sciences by the treatment that Dr. Hutton had received from the President, who knew nothing of mathematics, and only favoured his own pursuit of natural history. Unfounded as this was, it yet had considerable effect on some Fellows, who, joining Dr. Horsley, now organised a numerous party against Sir Joseph Banks. Such was the state of affairs, when the latter invited a select number of Fellows to his house, to consider the best measures to be taken for restoring peace to the Society. The result of this conference will be seen. In the first week of January, 1784, the following card was sent to every Member of the Society:—

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[9] It may be mentioned as evidence of the great interest which was felt in this dispute, that no less than 58 strangers were present at this Meeting.

[10] A petulant accusation made by the enemies of Sir Joseph Banks was, his not delivering Anniversary Addresses similar to those of Sir

> "THE PRESIDENT of the ROYAL SOCIETY presents his compliments to ——, and requests his attendance at the next ordinary Meeting of the Society, as it is probable that questions will be agitated on which the opinion of the Society at large ought to be taken."

About 170 Members responded to this summons; no strangers were admitted, and after the opening business was transacted, Mr. Anguish (the Accountant-General), at the conclusion of an appropriate

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John Pringle. "Soul of Sir John Pringle," says a reviewer, on the occasion of some great scientific discovery being announced to the Society, "why didst thou not animate thy successor, to open his mouth, and speak?"

speech, moved "that this Society do approve of Sir Joseph Banks as their President, and mean to support him in that office." The motion was seconded by the Hon. Henry Cavendish. A stormy discussion ensued, in which Mr. Poore, Mr. Maseres, Dr. Maskelyne, Mr. Maty, Dr. Horsley, Mr. Glenie, and Mr. Watson, took part against the President; but on the question being put, it was carried in the affirmative by a majority of 77, the numbers being 119 yeas and 42 noes. Such a result, it might be supposed, would have put an end to further proceedings; but, in the words of the author of the tract entitled, *Authentic Narrative of the Dissensions and Debates in the Royal Society*, "the minority felt no abashment. Two and two ever will be four, and the three angles of a triangle ever will be equal to two right angles, whatever majorities Presidents of Royal Societies may procure, to vote the contrary." With the view of preventing unnecessary discussions at the ordinary Meetings, the Council now enacted a Statute, making it compulsory that notices of motions should be given in writing, and signed by at least six Fellows. But even this was of no avail. On the 29th January, notice of a motion, signed by twelve Fellows, was given, "that the resolution of Council, requiring the Foreign Secretary to reside in London be rescinded; and to request Dr. Hutton to resume the office." This motion, after a stormy debate, was put to the vote on the 12th February, "and negatived by a majority of 38, there being 47 affirmatives, and 85 negatives." At the same Meeting, the two following notices of motions were given:—

1. "That it would be highly indecent and improper if the President of this Society should hereafter, either

in the election of Candidates, or upon any other occasion, endeavour to avail himself of his situation to influence the vote of any officer of the Society."

2. "That it would be highly indecent and improper if the President of this Society should in any future instance solicit votes either for or against any person[11], duly recommended by certificate as qualified to be made a Fellow of the Royal Society on the evening of election."

Both these notices were signed by Dr. Horsley, Dr. Maskelyne, Mr. James, Mr. Maty, Dr. Hutton, Mr. J. H. de Magellan, Mr. Maseres, Mr. Hollis, and Mr. Jodrell.

These motions were brought forward on the 26th February, and led to an angry debate. The first was negatived by a majority of 88, the numbers being, for the question 27, and against it 115. The second motion was then amended as follows: "That although it does not appear to the Society that either the present, or any former President, hath availed himself of his situation to influence the votes of officers in the elections of Fellows, it is yet necessary to declare, that it would be highly indecent and improper, if the President of the Royal Society should hereafter, either in the election of candidates, or upon any other occasion, endeavour to avail himself of his situation to influence the vote of any officer of the Society." "The motion for the amendment having been seconded and agreed to without a ballot, the question thus amended was put, and likewise negatived by a majority of 79, the ayes being 23, and the noes 102." A lull followed; the ensuing Meetings were devoted to the reading of papers which had been postponed during the former Meetings. But an unexpected incident plunged the Society into fresh troubles. At the ordinary Meeting of the 25th March, after the preliminary business had been transacted, Mr. Maty (Secretary) produced a pamphlet, which, says the Journal-book, "he offered as a present to the Society, from the anonymous editors." This was the tract entitled, *An Authentic Narrative of the Dissensions and Debates in the Royal Society.* It was no sooner laid upon the table, than the President rose, and informed the Meeting, "that he knew this pamphlet to contain such misrepresentation, and so many passages which reflected upon the honour of the Society, that he considered the offering it as a present an insult upon the Society, and that he should not therefore, unless called upon by a very perceptible majority of the Meeting, propose the usual thanks to the donor," The Minutes proceed to inform us that, "Dr. Horsley hereupon moved, that thanks be returned to the donor, Dr. Hutton seconded the motion, and it was further supported by Mr. Maty; but no one else speaking in favour of it, and several Members expressing their wish that it be withdrawn, the question was not put. Mr. Maty hereupon declined proceeding in the regular business of the Society, declaring it to be his opinion, that until the question moved and seconded was regularly put to the ballot, no other business could be proceeded with. Being called on from the Chair to read the papers before him, he at first acquiesced, but soon after declared that he resigned the office of Secretary. He thanked the Society for their many favours, and withdrew from his chair." It will readily be imagined, that this scene was not exactly calculated to smooth the troubled waters in which the Society were immersed. Strange, indeed, must have been the spectacle to witness the Secretary bearding the President of the Royal Society in his chair. Strangers too were present at this Meeting.

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[11] *Abstinere a fabis.* "To abstain from beans, or, in other words, to keep clear from elections," was a saying amongst the Athenians, who ballotted for their magistrates. This was the great cry amongst Sir Joseph's enemies, who conceived that he influenced all elections.

But the resignation of Mr. Maty, who, as we have seen, was one of the leading members of the party opposed to the President, tended greatly to restore peace to the Society. One struggle, however, remained, on the issue of which depended ultimate and decisive results: this was, the appointment of a successor to Mr. Maty's office. Dr. Horsley and his party brought forward Dr. Hutton as a candidate, in opposition to Dr. Blagden, who was supported by the President and Council. Before the election, Sir Joseph Banks circulated the subjoined card amongst the Fellows:—

> "In consequence of Mr. Maty's resignation of the Secretaryship, at the last Meeting of the Royal Society, the President takes this method of acquainting you, that, at his desire, *Dr. Blagden* has declared himself a Candidate for that office. From Dr. Blagden's known abilities and habits of diligence, the President does not doubt but he will, if elected, fulfil the duties of the station with advantage to the Society.
>
> "*Soho Square, March* 29, 1784."

Thus identifying himself with the success of Dr. Blagden, it is evident, that the election of the latter was absolutely necessary to enable Sir Joseph Banks to retain the Presidency.

The 5th May was appointed for the election. The Meeting-room was crowded by Fellows. The President took the chair at half-past eleven, A.M., and announced that the ballot would be kept open until half-past two P.M. At the latter hour the boxes were closed, and the scrutators reported that the numbers for Dr. Blagden were 139, and for Dr. Hutton 39. This great majority in favour of the candidate brought forward by the President and Council, had the happy effect which was anticipated. The ordinary Meetings resumed their former scientific appearance; and if harmony was not entirely restored, at least there was no longer any violent attempts made to interrupt the regular business of the Society.

Another, and a strong reason had, there is no doubt, considerable influence in restoring order. This was the discovery that Dr. Horsley had ulterior motives for his violent conduct, besides the immediate reformation of the subjects of his complaint. In short, it was shrewdly suspected that he aimed at being raised to occupy the chair, from whence he was so anxious to eject Sir Joseph Banks.

On this subject Lord Brougham says:—

"To have saved the Society from such a consummation as being under Dr. Horsley's presidency, was truly a service of the highest value, which, in a somewhat unusual, though certainly not an irregular manner, was rendered by the Members who attended and resisted the factious combination. His assuming the station of leader among the mathematicians was altogether preposterous; and he might have been raised to the Chair by dint of the intrigue which he set on foot, and the ferment which he excited in the bosom of the Society, without any victory whatever being gained for mathematical and physical science. His writings had never placed him higher than a mere amateur, and a somewhat feeble amateur in all essentials, though stout enough in the overbearing language of his polemical writings, and magniloquent enough in the diction of his self-laudatory prefaces. Some of his efforts are merely puerile like the sieve of Eratosthenes, which he tried, he says, *Diis propitiis usus;* some are far too easy to confer any fame, like the restoration of Apollonius's Inclinations; while his great attempt, an edition of Newton, is confessed by all, to be as signal a failure as any on record in the history of science[12]."

The late Professor Playfair has left in his Journal his impression of Dr. Horsley's philosophy. He says:—

"At Dr. Maskelyne's, soon after my arrival in London, I was introduced to Dr. Horsley. Our conversation turned first on Lord Monboddo, who is a great friend of Horsley. He expressed great respect for Lord M. for his learning and acuteness, and (what was more surprising) for the soundness of his judgment. He talked very seriously of the notion, of mind being united to all the parts of matter and being the cause of motion. So far as I could gather, Dr. Horsley supposes that every atom of matter has a soul, which is the cause of its motion, its gravitation, &c. What has made him adopt this strange unphilosophical doctrine I cannot tell, unless it be the fear that his study of natural philosophy should make him suspected of atheism, or at least of materialism. For it is certain that there is at present a prejudice among the English Clergy, that natural philosophy has a tendency to make men atheists or materialists. This absurd prejudice was first introduced, I think, by that illiberal though learned prelate, Dr. Warburton[13]."

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[12] *Lives of Men of Science*, Vol. II. p. 370.

The excessive haughtiness of Dr. Horsley's manner was extremely repulsive, even to his own party. Dr. Kippis, in his *Observations on the late Contests in the Royal Society*, says, alluding to Dr. Horsley, "The manner which he assumed during the late dissensions, will not easily be forgotten. The impression will long remain, on the minds of the Members, of the power of voice, and the energy of words, with which his denunciations were delivered. The high tone he adopted, went beyond the usual custom of public debates." More than once, it appears by his speeches, he called the Committees packed juries; and it is well known, that when he perceived a defeat approaching, he threatened the secession of the mathematical party, and exclaimed, "The President will then be left with his train of feeble amateurs, and that toy (the mace) upon the table, the ghost of the Society in which philosophy once reigned, and Newton presided as her minister[14]." It is stated that Sir Joseph Banks bore his victory without elation, and showed no jealousy nor prejudice[15]. This certainly is high praise. In his Address at the Anniversary, he alluded in the following terms to the dissensions:—

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[13] Playfair's *Works*, Append., p. 79.

[14] Dr. Horsley preceded Mr. Maty in the office of Senior Secretary, to which he was elected on the 30th Nov., 1773. From the controversies at the Royal Society, he plunged into those of theology, which indeed, he commenced in 1778, chiefly attacking Dr. Priestley. In 1788, he was created Bishop of St. David's; in 1793, translated to Rochester, and in 1802, to St. Asaph. He was much patronized by Chancellor Thurlow, who observed, that those who defended the Church, ought to be supported by the Church.

"From the appearance of our present Meeting, I will venture to foretell that our disputes are at an end; that the gentlemen from whom I have had the misfortune to differ in opinion, will abide by the decisions of the Society, which they have repeatedly taken, agree with me in a determination to throw a veil of oblivion over all past animosities, and unite once more in sincere efforts towards the advancement of the Society, the honour and reputation of which we have all equally pledged ourselves to support.

"But enough of dissension, a word, never more, I sincerely hope, to be heard within these walls, dedicated, as they are, by a generous Monarch, to the service of science. Peace and harmony should ever be found within them, for under the influence of peace and harmony among those who profess to cultivate it, science can only flourish.

"Let us unite once more then, my friends, to fulfil the wise purposes of our liberal Patron and Benefactor, and resume at the same time the prudent conduct of our predecessors, who for more than a century supported the honour of this Society unsullied, and have bequeathed it to us as pure as they received it. They never failed to sacrifice such resentment as rose among them to the good of the general cause in which they felt themselves equally embarked; for although some individuals among them have heretofore indulged their feelings by appealing to the public when they imagined the welfare of the body at large was in danger, they never once attempted to convert the Meetings instituted for the advancement of knowledge into assemblies of debate and controversy."

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[15] Dr. Lort, in a letter written at the height of the dissensions, says:—"Such an opposition has been stirred up against the President of the Royal Society, by some turbulent spirits, that I doubt whether he will choose to fill the chair another year. Dr. Horsley has set himself at the head of this opposition, which seems to be very ill-founded, and to arise merely from that levelling spirit and impatience of all government which infects the present age."—*Illustrations of the Lit. Hist. of the 18th Century*, Vol. VII.

The year 1784 is certainly a memorable one in the annals of the Royal Society. We have seen how it was marked by violent dissensions, foreign to matters of science; we have now to examine the scientific events of that year, in relation to a discovery which has of late given rise to much discussion, and unduly harassed the scientific world. I allude to the Composition of Water, the discovery of which is attributed by some to Cavendish, and by others to Watt[16]. The reader will perhaps arrive at the conclusion, that these great men made the discovery independently of each other.

It may be proper to premise that in 1776, Volta fired inflammable air (hydrogen gas mixed with common air) by the electric spark[17]. In 1778, Macquer observed, that moisture consisting of pure water was formed when inflammable air was burnt in a close vessel full of common air. But this water was supposed to be merely the fluid which was held in suspension by the air. In 1781, John Warltire fired a mixture of common and inflammable airs, in a close metal flask, or globe, by the electric spark. His experiments are detailed in a letter which he wrote to Dr. Priestley, dated Birmingham, 18th April, 1781, in which he says, "after firing the air, the glass vessel became dewy." Priestley observes upon this letter, "I must add, that the moment he (Mr. Warltire) saw the *moisture* on the inside of the close glass vessels, it confirmed an opinion he had long entertained, viz., that common air deposits its moisture when it is phlogisticated. With me it was a mere random experiment, made to entertain a few philosophical friends[18]." It is not a little singular, that although Cavendish states in his Paper, *Experiments on Air*[19], that Mr. Warltire observed the moisture at the above date, Watt gives Cavendish the credit of being the first who "observed the dewy deposit[20]."

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[16] I am indebted to Professors Graham and Miller, and to Mr. Brande, for their kindness in revising the following pages relating to this subject.

[17] See letter from Volta to Priestley, dated Como, Dec. 10, 1776, in Priestley's *Exp. on Air.*

It appears, that as soon as Dr. Priestley's *Experiments and Observations* were published, Cavendish made several experiments upon air. His laboratory notes, in the possession of the Duke of Devonshire, were "accurately examined" by Mr. Hatchett and Mr. Hudson, for the purpose of ascertaining whether they contained anything indicative of the dates of Cavendish's conclusions, respecting the theory of the formation of water; but Mr. Hatchett in a letter to the present Mr. Watt, says, that "he could not find anything in them which referred to any date connected with the time when Mr. Cavendish probably first conceived his theory[21].” And Mr. Hudson declared, “I do not find in these Journals of the experiments anything more than the simple statement of the facts, without any casual mention of theoretical opinions[22].” Fac-similes of these laboratory notes were published by Mr. Harcourt, in the 8th volume of the *Reports of the British Association*;—so that those who are interested may now draw their own conclusions from them.

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[18] Priestley's *Experiments on Air*, Vol. II. p. 385.

[19] *Phil. Trans.*, 1784, p. 126.

[20] *Ibid.*, 1784, p. 332.

On the 15th, January, 1784, Cavendish's Paper entitled, *Experiments on Air*, was communicated to the Society. In this document the following passage occurs: “All the foregoing experiments, on the explosion of inflammable air, with common and dephlogisticated air, except those which relate to the cause of the acid found in the water, were made in the summer of the year 1781, and mentioned by me to Dr. Priestley, who, in consequence of it, made some experiments of the same kind, as he relates in a Paper printed in the preceding volume of the *Transactions*[23].” This paragraph has been made the subject of frequent criticism, because, although occurring in the Paper, it appears to have been subsequently interpolated. The manuscript, in fact, which is preserved in the Archives of the Society, does not contain the passage, which appears in a supplementary form on a smaller sheet of paper, and of a different quality. Some persons who have been at the trouble of examining the hand-writing of the two manuscripts, and that of Dr. Blagden, conceive the passage in question to have been written by the latter[24]. I concur in this conclusion: but as the question is one of importance, fac-similes of the writing in the interpolated passage, and of Cavendish and Blagden, are annexed. It is, however, reasonable to conclude, that, as there is no allusion to different authorship in the paper, which with the interpolated passage was printed, published, and received, as the writing of Cavendish, the latter approved the interpolation, and therefore the passage must be taken as part of the published paper[25].

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[21] *Corr. of Watt on the Composition of Water*, 1846, p. xxxvi.

[22] *Ibid.*, p. xxxvii.

[23] The Paper alluded to is entitled, “Experiments relating to Phlogiston, and the seeming conversion of Water into Air.” In it he alludes to “Mr. Cavendish's experiment on finding water on the decomposition of air,” and to Mr. Watt, mentioning to him, “the possibility of the conversion of water or steam into permanent air.”

But there is another circumstance worthy of mention, which has not hitherto been noticed. Cavendish's paper is printed as having been read on January 15, 1784. It was commenced at the Meeting of that date, but the reading occupied the time of two evenings. As usual at that period, a very lengthy and elaborate abstract of the paper was read at the Meeting ensuing that on which the reading was concluded, which is inserted in the Journal-book, and extends over twelve folio pages. In this abstract, no mention whatever is made of the experiments having been performed in 1781; and there is no attempt to attach a date of discovery prior to that when the Paper was read.

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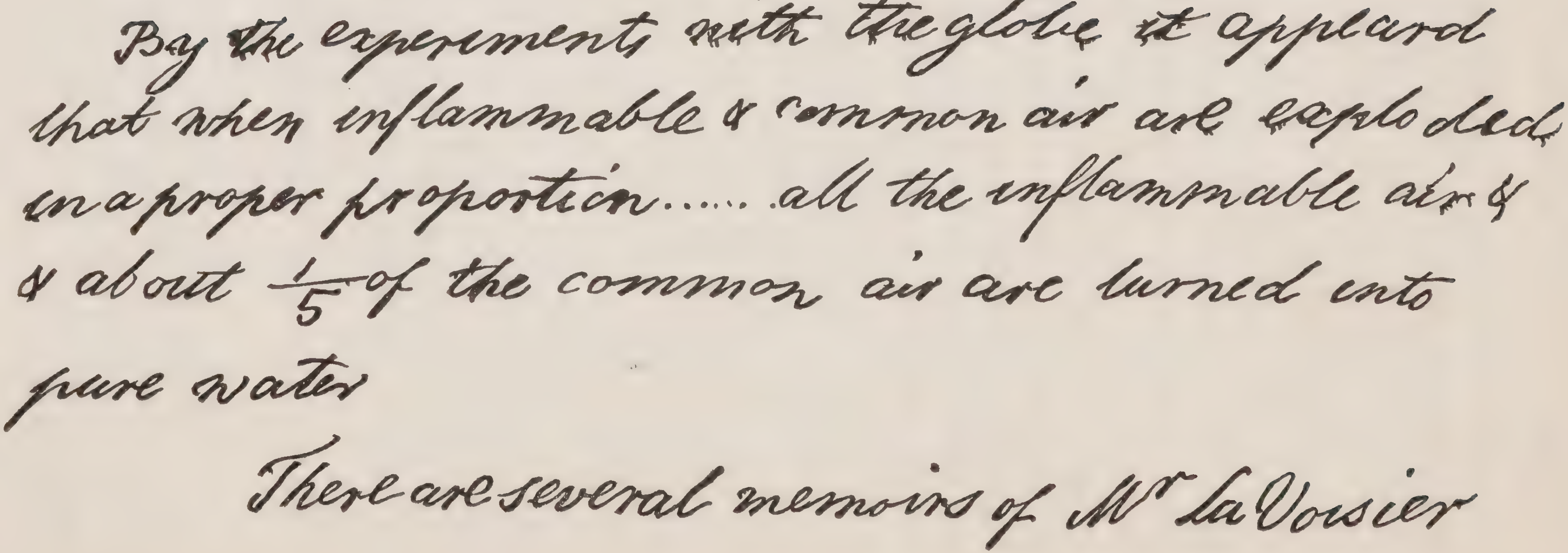
[24] This could not have been done officially when the paper was read, for Blagden was not elected Secretary until May 5, 1784.

[25] It is desirable to mention, that Blagden was on intimate terms of friendship with Cavendish, who left him 15,000*l.*, and an annuity of 500*l.*

No. 1.

Cavendish's Hand-writing in his Paper.

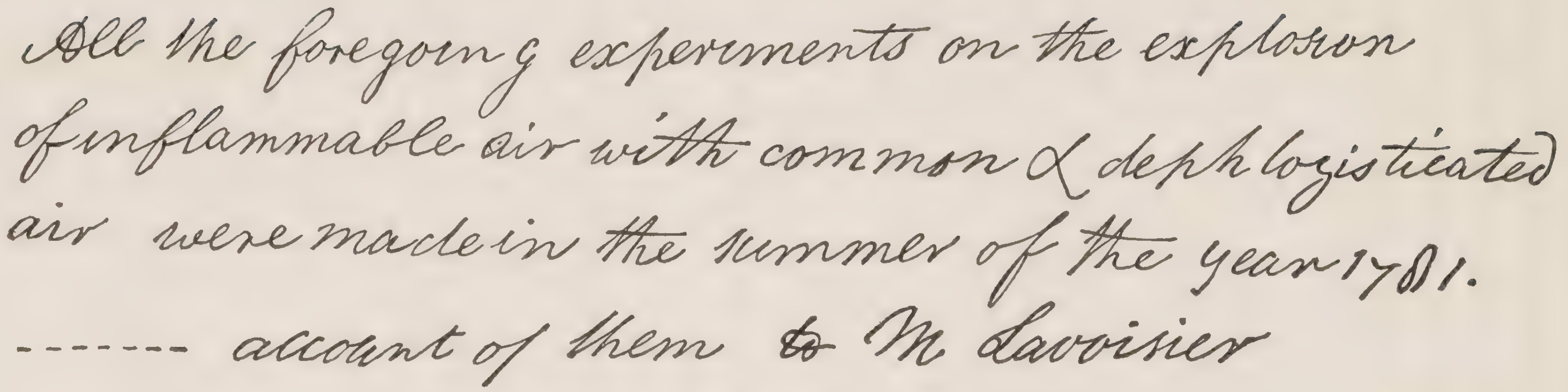


By the experiments with the globe it appeard that when inflammable & common air are exploded in a proper proportion...... all the inflammable air & & about $\frac{1}{5}$ of the common air are turned into pure water

There are several memoirs of Mr laVoisier

No. 2.

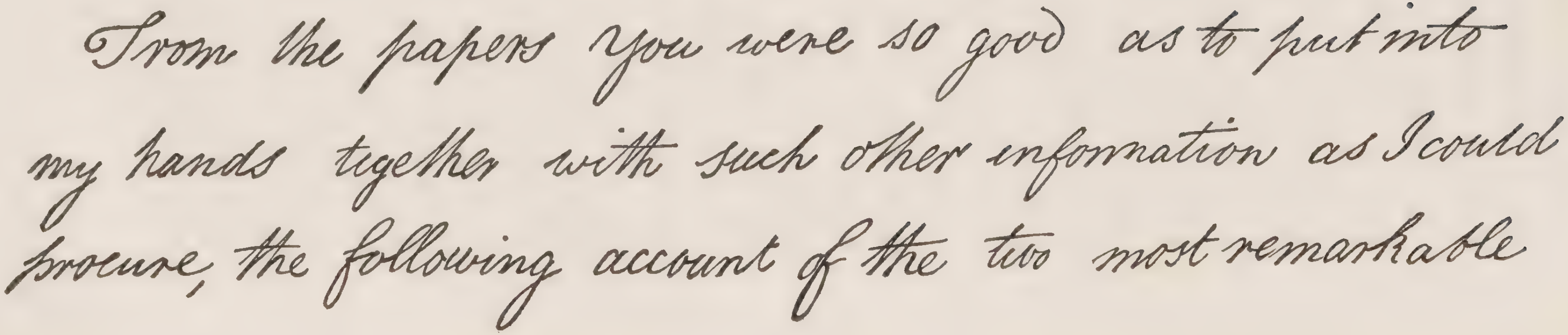
Hand-writing in interpolated Passage.



All the foregoing experiments on the explosion
of inflammable air with common & dephlogisticated
air were made in the summer of the year 1781.
------- account of them ~~to~~ M Lavoisier

No. 3.

Blagden's Hand-writing.



From the papers you were so good as to put into
my hands together with such other information as I could
procure, the following account of the two most remarkable

On the 13th December, 1782, Watt, in a letter to Dr. Black, says: "Steam may, under proper compression, be an elastic fluid nearly as specifically heavy as water; at which point, I conceive it will again change its state, and become something else than mere steam and water. My opinion has been, that it would then become air[26]."

Shortly after the date of this letter, Priestley tried numerous experiments on water. Watt alludes to these in a letter to Smeaton, dated April 1783, in which he says: "By the help of Dr. Priestley's experiments, I have attempted to demolish two of the most ancient elements, air and water[27]." On the 21st April, 1783, Watt addressed a letter to Black, containing this important passage: "In the deflagration of the inflammable and dephlogisticated airs, the airs unite with violence,—become red hot,—and on cooling, totally disappear. The only fixed matter which remains is *water;* and *water*, *light*, and *heat*, are all the products. Are we not then authorized to conclude, that water is composed of dephlogisticated and inflammable air[28]?"

And on the 26th April, 1783, Watt wrote to Dr. Priestley, also giving his theory of the composition of water, and requesting that it might be read to the Royal Society, after a Paper by the Doctor, describing his experiments. But on the 29th April, Priestley wrote to Watt, saying, "Behold with surprise and with indignation the figure of an apparatus, which has utterly ruined your beautiful hypothesis." This caused Watt to request that the reading of his Paper might be delayed, until he had examined the experiments said to contradict his theory. On the 2nd May he wrote again to Priestley, reasserting his views:—

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[26] *Correspondence*, p. 6.

[27] Ibid., p. 23.

[28] Ibid., p. 19.

> "I deny," he says, "that your experiment ruins my hypothesis. It is not founded on so brittle a basis as an earthen retort......I maintain my hypothesis until it shall be shewn that the water found after the explosion of pure and inflammable air, has some other origin. I have read Scheele since I saw you, and found several things to confirm my hypothesis."

It is remarkable, that writing thus, it was not until March, 1784, that Watt took any steps to advance his claim to the discovery; and it may reasonably be doubted whether he would have done so then, had not Cavendish's Paper been read. It must be admitted, that Watt's silence was the extreme of caution; indeed, it is the opinion of one of the most eminent living philosophers, that "much censure attaches to him[29]:" for believing the truth of his theory, it was his duty to propound it to the world. If, for argument's sake it be assumed, that the discovery of the composition of water was of a nature to confer a great and immediate benefit on mankind, it must be allowed that Cavendish, by his open communication of it to the Royal Society for insertion in the *Philosophical Transactions*, a work of universal celebrity, and extended circulation, was the first to make it generally known; whereas Watt did not come forward until Cavendish had made the discovery public.

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[29] Dr. Faraday, with whom I have conversed at length on the subject.

The fact, that Watt was alarmed by Priestley's letter, and occupied on his steam-engines at Birmingham, will not relieve him from the heavy responsibility of not declaring boldly what he believed to be the truth. That he felt aggrieved, however, when he heard that Cavendish had anticipated him, appears by a letter to De Luc[30], dated Birmingham, 6th March, 1784, in which he distinctly accuses Cavendish of plagiarism, and adds: "I by no means wish to make any illiberal attack on Mr. C. It is *barely* possible he may have heard nothing of my theory; but, as the Frenchman said, when he found a man in bed with his wife, 'I suspect something;'" and in another place he says, "At present *je me sens un peu blessé;* it seems hard, that in the first attempt I have made to lay any thing before the public, I should be thus anticipated."

Watt now requested that his letters to Dr. Priestley, of the 26th April, 1783, might be read before the Society, which was done on the 22nd April, 1784; and on the 29th of the same month his second letter was read. In July, of the same year, his Paper was printed in the *Transactions*, bearing the erroneous date of 1784, instead of 1783, which stands upon the manuscript[31]. Appended to this Paper is the annexed note, relative to the letter addressed by Watt to Dr. Priestley, on the 26th April, 1783: "This letter Dr. Priestley received at London; and, after shewing it to several Members of the Royal Society, he delivered it to Sir Joseph Banks, the President, with a request that it might be read at some of the public Meetings of the Society; but before that could be complied with, the author having heard of Dr. Priestley's new experiments, begged that the reading might be delayed. The letter, therefore, was reserved until the 22nd April last, when, at the author's request, it was read before the Society. It has been judged unnecessary to print that letter, as the essential parts of it are repeated, almost *verbatim*, in this letter to Mr. De Luc; but to authenticate the date of the author's ideas, the parts of it which are contained in the present letter, are marked with double commas[32]."

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[30] Mr. J. A. De Luc, the well-known Genevese philosopher: he was a Fellow of the Royal Society, which Watt was not at this time. It was from De Luc that Watt first heard of Cavendish's paper. Apprising him of the circumstance, he says, "*Attendez vous à quelque chose qui vous étonnera. On expose et prouve votre système, mot pour mot, et on ne dit rien de vous.*"

[31] It is remarkable, that the separate copies of Cavendish's

On the 2nd May, 1784, Watt sent De Luc a short paper for communication to the Society, entitled "Sequel to the Thoughts on the constituent Parts of Water and Dephlogisticated Air," which was read on the 6th May, and printed in the *Transactions* for 1784. In his letter to De Luc, accompanying this

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Paper bear the date of 1783 instead of 1784. Cuvier was misled by one of these, to say that Cavendish's paper dates from "January, 1783:" see *Eloges Historiques*, Tome II. p. 87. It is due to Mr. Cavendish to say, that as soon as the error was discovered, he wrote to the editor of one of the principal foreign Journals to correct it.

[32] The above note is by Watt; he appears to have been anxious that Dr. Blagden should have inserted the dates of his experiments in the margin. This the latter did not do. The dates are, 7th May, 1783; 8th June, 9th July, 10th July, Nov. 1, and Nov. 22.

paper, he says: "I send you enclosed the sequel to my letter on dephlogisticated air; which, after all the delay, is hastily and badly composed. The fact is, that the subject begins now to wear out of my mind, and I have not time to refresh my memory by fresh experiments, as I have had no leisure hours since I saw you." This, certainly, is not the language of a man who had just made a discovery. It is gratifying to find that Sir Joseph Banks paid great attention to the philosopher, when he visited London, which Watt suitably acknowledges in his letters to De Luc. Watt, however, evidently felt convinced that he had been ill-treated, nor did this feeling subside after the publication of his papers. On the 15th May, 1784, in a letter to Mr. Fry, of Bristol, he says:—

"The Papers which I mentioned to you that I had written, on the Composition of Water, have been read at the Royal Society, I am told, with applause. But I have had the honour, like other great men, to have had my ideas pirated. Soon after I wrote my first paper on the subject, Dr. Blagden explained my theory to M. Lavoisier, at Paris; and soon after that, M. Lavoisier invented it himself, and read a paper on the subject to the Royal Academy of Sciences[33]. Since that, Mr. Cavendish has read a paper to the Royal Society, on the same idea, without making the least mention of me. The one is a French financier, and the other a member of the illustrious house of Cavendish. Rich men may do mean actions. May you and I always persevere in our integrity, and despise such doings!"

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[33] Respecting the claim set up by Lavoisier to the discovery, little now need be said, for French philosophers have united in repudiating it. Cuvier, in his *éloge* of Cavendish, observes, alluding to the discovery of the composition of water, "*cette théorie qui a produit dans les sciences une si grande révolution, a du sa première origine à une découverte de M. Cavendish,*" (p. 88); and Arago and Dumas have since declared in favour of Watt, which opinion, though differing from that of Cuvier, removes the glory of the discovery to England.

Dr. Blagden, it should be remembered, was not elected Secretary until May, 1784. He was not even on the Council in 1783, so that the official errors of that year cannot be laid to his charge.

But it is very probable that he was acquainted with Watt's Paper, and this is borne out by a letter from Mr. Kirwan to Watt, in which he says, under the date of the 13th December, 1783:—"M. Lavoisier certainly learned your theory from Dr. Blagden, who first had it from Mr. Cavendish, and afterwards from your letter to Dr. Priestley, which he heard read, and explained the whole minutely to M. Lavoisier last July. This he authorized me to tell you." This, it must be confessed, is strong evidence in favour of Watt's originality of discovery.

In the introduction to the *Correspondence on the Composition of Water*, it is stated that Mr. Brande carefully examined the books of the Royal Society, and expressed his opinion that the records which he there found, were "satisfactory as to the priority of Mr. Watt's claims; in short, leave nothing further to be said against them." There is a review of Mr. Watt's Paper in Maty's *Journal*, in which the following paragraph occurs: "The direct investigation of the properties of a new thing, or its relations to other things, requires that exertion of industry and abilities which men mean to praise, if they mean any thing, when they speak of inventors. Among these we do not scruple to place Mr. Watt, as far as relates to the Paper before us[34]."

In Thomson's *Chemistry*, editions 1804 and 1807, and Murray's *Chemistry*, editions 1806 and 1819, priority is assigned to Watt, while the independence of Cavendish is maintained. Dr. Dalton, in his *New System of Chemical Philosophy*, observes, "the composition and decomposition of water were ascertained; the former by Watt and Cavendish, the latter by Lavoisier and Meusnier."

Turning to France, we have the opinions of MM. Arago and Dumas in favour of Watt. At a Meeting of the French Academy in January, 1840, M. Arago declared, on the occasion of presenting to that learned body Mr. Muirhead's translation of his *Eloge* of Watt, that he conceived Mr. Harcourt's statements in favour of Cavendish to be inaccurate, and M. Dumas added: "*qu'après avoir examiné attentivement l'argumentation de son confrère; qu'après avoir fait aussi à Aston Hall, chez M. Watt fils, une étude scrupuleuse de la correspondance de l'illustre ingénieur, il adopte complétement et dans toutes ses parties, l'histoire que M. Arago a écrite de la découverte de la composition de l'eau*[35];" and in January, 1847, when M. Arago presented the Academy, on the part of Messrs. Watt and Muirhead, with a copy of the *Correspondence*, M. Arago said: "*l'ouvrage renverse de fond en comble l'échafaudage d'arguties élevé à grand peine par le révérend Harcourt Vernon*[36] *et par ses proneurs.*"

Berzelius, the great chemist, has likewise declared in favour of Watt.

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[34] Vol. VII. p. 106.

[35] *Comptes Rendus*, p. 111.

[36] So in original.

On the other hand, we have the laboratory notes of Cavendish, bearing the dates of 1781 and 1782, which show that, during the latter year, he was closely engaged in examining the results of combustion; but there is no evidence that he made these experiments public. Indeed, several men of science conceive that Mr. Harcourt injured the cause of his client, by publishing Cavendish's Journal, *Amicus Cavendish, sed magis amica veritas.* Lavoisier, says: "*Ce fut le* 24 *Juin*, 1783, *que M. de La Place et moi, en presence de plusieurs Académiciens, et de M. Blagden, aujourd'hui secrétaire de la Société Royale de Londres, que ce dernier nous apprit que M. Cavendish avoit déjà essayé, à Londres, de bruler de l'air inflammable dans des vaisseaux fermés, et qu'il avoit obtenu une quantité d'eau très-sensible*[37];" but Dr. Blagden, in his letter to Dr. Lorenz Crell, published in the *Chemische Annalen* for 1786, says: "Lavoisier should have stated that I had made him acquainted with Messrs. Cavendish and Watt's conclusions. He really discovered nothing but what had before been pointed out to him to have been previously made and demonstrated in England." The reader will do well to peruse the whole of this interesting letter, which he will find in the Appendix to Watt's *Correspondence.*

In the article "Water," contained in the first edition of Rees's *Cyclopædia*, it is stated, "The honour of discovering the composition of water was reserved for Cavendish, who, in 1781, proved beyond a doubt that the composition of hydrogen and oxygen produced this fluid."

Dr. Whewell, in his new edition of the *Inductive*

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[37] *Mémoires de l'Académie Royale des Sciences*, 1784, p. 472.

Philosophy (1847), records his conviction that Cavendish is entitled to the merit of the discovery. He says: "Watt not only did not anticipate, but did not fully appreciate, the discovery of Cavendish and Lavoisier;" and in another place he adds: "I conceive that the discussion which the subject has recently received, has left no doubt on the mind of any one who has perused the documents, that Cavendish is justly entitled to the honour of this discovery, which in his own time was never contested[38]."

It would be easy to adduce more evidence in favour of both parties[39], but I prefer giving the following extract from the introduction to the *Correspondence*, &c. vouching for the accuracy of the dates.

"15th January, 1784.—In his paper read to the Royal Society this day, Mr. Cavendish *for the first time* states publicly in writing, and in his own person, his conclusions as to the compound nature of Water; coinciding generally with those of Mr. Watt, but omitting the consideration of latent heat, as well as the mention of Mr. Watt's name.

"March.—Mr. Watt, finding that in Mr. Cavendish's Paper his own theory had been fully explained and proved, and his name excluded, expresses his indignation, and takes immediate steps for having his own letters of 26th April and 26th November, 1783, read at the Royal Society, with their true dates.

"21st April.—MM. Meusnier and Lavoisier read to the Academy of Sciences their Memoir on the Decomposition of Water, which is printed in the same year.

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[38] Notes, p. 206.

[39] Dr. Peacock, (Dean of Ely), and Mr. Robert Brown, concur in awarding the merit of discovery to Cavendish.

"22nd April.—Mr. Watt's first letter, which had till now remained in the custody of the President, is, according to his request, read at the Royal Society.

"29th April.—His second letter is also read. Both letters are ordered to be printed in the *Philosophical Transactions.*

"5th May.—Dr. Blagden is appointed Secretary to the Royal Society, and is entrusted with the superintendence of the printing of both of Mr. Watt's letters, to be embodied in one Paper, with marks distinguishing each from the other.

"June.—M. Lavoisier's Memoir is printed with additions.

"July.—Mr. Watt's Paper is printed, under the *sole* superintendence of Dr. Blagden, *and with the erroneous date of* 1784 *instead of* 1783. Mr. Cavendish's Paper is printed;—the separate copies, *with the erroneous date of* 1783 *instead of* 1784; and the Paper, itself containing two interpolations, made by Dr. Blagden some months after it had been read to the Society. In one of these Mr. Watt's name is *for the first time* mentioned as if by Mr. Cavendish, and his theory alluded to as his own[40]."

It is most gratifying to find, upon the testimony of the present Mr. Watt, that when his father became a Fellow of the Royal Society, in 1785, he formed the personal acquaintance of Mr. Cavendish, and lived upon good terms with him. How greatly is it to be desired that all scientific rivalries might terminate in so amicable a manner!

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[40] Summary, p. 126.

CHAPTER VII.

The Society petition George III. for Funds to commence a Geodætical Survey—General Roy appointed to act under the direction of the Council—Ramsden constructs the Instruments—His want of punctuality—Account of Operations—Copley Medal awarded to General Roy—President's Address on the occasion—Sir Joseph Banks lays before George III. Sir William Herschel's plan for constructing a large Reflecting Telescope—The King defrays the Expense—Construction of the large Reflector—Herschel's Account of it—Letter from Sir John Herschel descriptive of its present state—Herschelian Telescope Song—Lord Stanhope's Legacy to the Society—Prince of Wales, and Dukes of York and Cumberland, elected Fellows—The Society present Congratulatory Addresses to the King and Queen—Linnean Society established—Volta sends account of his Electrical Discoveries to the Royal Society—Copley Medal awarded to him—Sir William Jones presents his Oriental Manuscripts to the Society—Sir Clifton Wintringham's Bequest—Sir Everard Home's Physiological Labours—Count Rumford's Endowment—Memoir of him—Medal bearing his name—Letters from him—He is awarded the First Medal—Experiments by Cavendish to ascertain the Density of the Earth—Mr. Baily's Experiments—Results arrived at—Contribution towards defraying War Expenses—Retrospective Financial Review—Income and Expenditure of the Society.

1780—1800.

IN 1784, the Council petitioned George III. to place funds at the disposal of the Society, to commence a geodætical survey, with the immediate object of establishing a trigonometrical connexion between the Observatories of Paris and Greenwich, in order to determine the difference of longitude. On the 24th June, 1784, the President informed the Council, that his Majesty had given his consent to the undertaking, "and had permitted Major-General Roy[1] to proceed in the execution of the plan, under the direction of the President and Council of the Royal Society." General Roy commenced his operations by measuring a base line of 27,404 feet on Hounslow Heath[2]. As the greatest accuracy was essential, Ramsden was directed to construct a large and exquisitely-divided theodolite, having a horizontal circle of three feet in diameter, and carrying telescopes of 36 inches focal length. This instrument, which was ordered early in 1784, was not finished until the summer of 1787, although it appears by the Minutes of Council, that every exertion was made to hasten Mr. Ramsden. General Roy complained loudly at the delay. In his second Memoir, describing the triangulation, he says: "It was little expected that nearly three full years would have elapsed before, even in this country, an instrument could be obtained for taking the angles[3]." Ramsden, it is well known, was more remarkable for his excellent instruments than for his punctuality. George III., his great patron, frequently employed him to construct instruments, and for this purpose required his presence at the Palace. On one occasion, as is related, the King was apprised of Ramsden's attendance in an ante-chamber, according to appointment. The instrument-maker was admitted, and having shown his Majesty's order for the appointment, the King replied: — "You are precise,

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[1] General Roy, author of *The Military Antiquities of the Romans in Great Baitain*, a work of considerable research, was appointed to execute the survey through the influence of Sir J. Banks.

[2] An interesting account of the measurement of this base will be found in the *Transactions* for 1785.

[3] *Philosophical Transactions* for 1790, Vol. LXXX. p. 111.

Mr. Ramsden, with regard to the hour, and day of the month, but you are a year behind the time I appointed." In fact, Ramsden had mislaid the King's memorandum, and forgotten all about it, until it accidentally turned up in the course of the following year. But to resume. The theodolite was ready on the 31st July, 1787[4], on which day the triangulation was commenced, and before the end of the year carried to the eastern coast of Kent, and connected with a series of triangles on the opposite coast, which had been extended from Dunkirk to Calais and Boulogne, by Cassini, Mechain, and Legendre. A base of verification of 28,535 feet was measured on Romney Marsh with a steel chain, and the difference between the measured length, and the length computed from the Hounslow Heath base, through the series of triangles, was found to be only 28 inches. So near an agreement might afford a satisfactory proof of the general accuracy of the work; but this has since been submitted to a more severe and decisive test. In 1821, and some of the following years, the angles were re-measured by Colonel (now General) Colby, and Captain Kater, with the same excellent instrument, and the triangles calculated with reference to the sphericity of the earth, which had not previously been taken into account. On comparing the results with those of General Roy, the greatest difference was found to be in the distance between the signals at Dover and

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[4] This instrument is now in the possession of the Royal Society, to whom it was presented by George III. It consists of 66 parts, packed in 4 cases. Ramsden was awarded the Copley Medal in 1795, for his inventions and improvements in the construction of instruments.

Calais, and this amounted only to 12½ feet, the whole distance being 137,472 feet[5]. The labours of General Roy were rewarded by his receiving the Copley Medal in 1785, on which occasion Sir Joseph Banks, in his address, said: "I have the more satisfaction in executing this, the most pleasing function of my office, when I recollect that I was myself an eye-witness of the assiduity, activity, and skill, with which you conducted the execution of the work, which now receives the firstfruits of its reward."

The operations of General Roy served as a basis to those of a more extensive nature, embracing a general survey of the British Islands, which was commenced in 1791, under the direction of the Master-General of the Ordnance, and is still going on[6]. The first step was to remeasure General Roy's base on Hounslow Heath; this was done under the superintendence of Colonel Williams, Captain (afterwards General) Mudge, and Mr. Dalby, who had previously assisted General Roy. The result of the measurement was found to differ from General Roy's by only 2¾ inches[7].

In 1785, the President, at the request of Sir William Herschel, and with the sanction of the Council, laid before George III. that great astronomer's scheme for the construction of a reflecting telescope of colossal dimensions. The King approved the plan, and agreed to defray the expense of constructing the instrument, which was commenced at the latter end of 1785, and completed on the 27th August, 1789. Sir William Herschel has given a very complete and interesting description of this telescope in the *Philosophical Transactions* for 1795, in which he says :—

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[5] See *Phil. Trans.*, 1828, p. 176. The paper contains an account of the manner in which the operations were carried on. I may state here, that the original MS. observations and field-notes are in the Archives of the Society.

[6] See *Phil. Trans.*, from 1795 to 1803; *Trigonometrical Survey of England and Wales*; and *Astronomical Observations made with Ramsden's Zenith-sector*, containing an explanatory preface by General Colby.

[7] The expense of the Trigonometrical surveys to the end of 1846, was 1,462,522*l*. Copies of the Ordnance Maps are sent to the Society.

"When I resided at Bath, I had long been acquainted with the theory of optics, and mechanics, and wanted only that experience which is so necessary in the practical part of these sciences. This, I acquired by degrees at that place, where, in my leisure hours, by way of amusement, I made for myself several 2-feet, 5-feet, 7-feet, 10-feet, and 20-feet Newtonian telescopes; besides others of the Gregorian form. My way of making these instruments at that time, when the direct method of giving the figure of any of the conic sections to specula was still unknown to me, was, to have many mirrors of each sort cast, and to finish them all as well as I could; then to select by trial the best of them, which I preserved; the rest were put by to be re-polished. In this manner I made not less than 200 7-feet; 150 10-feet, and about 80 20-feet mirrors; not to mention those of the Gregorian form.

"In the year 1783, I finished a very good 20-feet reflector, with a large aperture, and mounted it upon the plan of my present telescope. After two years observation with it, the great advantage of such apertures appeared so clearly to me, that I recurred to my former intention of increasing them still farther; and being now sufficiently provided with experience in the work I wished to undertake, the President of our Royal Society, who is always ready to promote useful undertakings, had the goodness to lay my design before the King. His Majesty was graciously pleased to approve of it, and with his usual liberality to support it with his royal bounty.

"In consequence of this arrangement, I began to construct the forty-feet telescope about the latter end of 1785. The wood-work of the stand and machines for giving the required motions to the instrument were immediately put in hand, and forwarded with all convenient expedition. In the whole of the apparatus none but common workmen were employed[8], for I made drawings of every part of it, by which it was easy to execute the work, as I constantly inspected and directed every person's labour; though sometimes there were not less than 40 different workmen employed at the same time. While the stand of the telescope was preparing, I also began the construction of the great mirror, of which I inspected the casting, grinding, and polishing; and the work was in this manner carried on with no other interruption than what was occasioned by the removal of all the apparatus from Clay Hall, where I then lived, to my present situation at Slough. Here, soon after my arrival, I began to lay the foundation, upon which by degrees the whole structure was raised as it now stands; and the speculum being highly polished and put into the tube, I had the first view through it on Feb. 19, 1787. I do not, however, date the completing of the instrument till much later; for the first speculum, by a mismanagement of the person who cast it, came out thinner on the centre of the back than was intended, and on account of its weakness would not permit a good figure to be given to it. A second mirror was cast Jan. 26, 1788, but it cracked in cooling. Feb. 16, we re-cast it with particular attention to the shape of the back, and it proved to be of a proper degree of strength. Oct. 24, it was brought to a pretty good figure and polish, and I observed the planet Saturn with it. But not being satisfied, I continued to work upon it till Aug. 27, 1789, when it was tried upon the fixed stars, and I found it to give a pretty sharp image. Large stars were a little affected with scattered light, owing to many remaining scratches in the mirror. Aug. 28, 1789, Having brought the telescope to the parallel of Saturn, I discovered a sixth satellite of that planet; and also saw the spots upon Saturn better than I had ever seen them before; so that I may date the finishing of the 40-feet telescope from that time[9]."

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[8] It is remarkable, that in the construction of Lord Rosse's monster telescope, all the persons employed were also common workmen. In an account of this telescope which I published, entitled, "A Day at Birr Castle," the following passage occurs:—"It is proper to mention, that all the workmen are Irish; they were trained under the superintendence of Lord Rosse, being taken from common hedge-schools, and selected in consequence of their giving evidence of mechanical skill. The foreman, a man of great intelligence, is of similar origin, and Lord Rosse assured me, such was his skill, that during his Lordship's absence, he felt confident that his foreman could construct a telescope with a six-foot speculum, similar in all respects to that now erected."

Such is the very interesting account, in Sir William Herschel's words, of the manner in which he proceeded in the construction of his celebrated reflecting telescope. A long and detailed memoir follows, in which Sir William describes every portion of the instrument, made more comprehensive by the accompaniment of elaborate and beautiful engravings.

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[9] See his Paper communicating this discovery, in the *Phil. Trans.* for 1790.

It would carry us beyond our legitimate field of operations, to give any further account of this instrument, to which the *Philosophical Transactions* are indebted for many most valuable astronomical Papers from the pen of Sir William Herschel[10].

I cannot, however, forbear inserting the following letter from Sir John Herschel, kindly written in answer to a few enquiries, which I found it necessary to make relative to the telescope:—

"*Collingwood, March* 13, 1847.

"MY DEAR SIR,

"IN reply to your queries respecting the forty-feet reflecting telescope, constructed by my father, I have to state, 1st, That King George III. munificently defrayed the *entire* cost of that instrument, (including, of course, all preparatory cost in the nature of construction of tools, and of the apparatus for casting, grinding, and figuring the reflectors, of which two were constructed) at a total cost of 4000*l.* 2nd, The wood-work of the Telescope being so far decayed as to be dangerous, in the year 1839, I pulled it down (the operation commenced on Dec. 5), and having cleared away the frame-work, &c., piers were erected on which the tube was placed, *that* being of iron and so well preserved, that although not more than one twentieth of an inch thick, when in the horizontal position it sustained within it all my family, and continues to sustain enclosed within it to this day, not only the heavier of the two reflectors, but also all the more important portions of the machinery, such as being of iron and brass stood in no fear of decay, as well as all such portions of the polishing apparatus as would go into it, to the amount, I presume, of a great many tons, which had, when I last saw it, produced no sign of weakness or sagging down. This great strength and resistance to decay, is to be attributed to the peculiar principle of its internal structure, which is in effect very similar to that for which, in later times, a patent has been taken out under the name of *Corrugated Iron Roping, &c.*, but of which the idea was, I have every reason to believe, original with my father at the time of its construction; as was, I am disposed to think, also the *system of triangular arrangement* adopted in the wood-work, being a perfect system of 'diagonal bracing,' or rather that principle to which the 'diagonal bracing' system owes its strength.

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[10] Some idea may be formed of the wonderful diligence of Sir William Herschel from the fact, that there are no less than 69 Papers by him in the *Transactions*.

"The other mirror and the rest of the polishing apparatus are on the premises, but in a situation adapted only for preservation, and neither for use nor inspection. The iron grinding tools and polishers are placed underneath the tube, let into the ground, and level with the surface of the gravelled area in which it stands.

"I remain, my dear Sir,
"Yours very faithfully,
"*C. R. Weld, Esq.*" "J. F. W. HERSCHEL.

The subjoined verses from the pen of Sir John Herschel form an appropriate sequel to this interesting letter.

THE HERSCHELIAN TELESCOPE SONG.

Requiem of the Forty-feet Reflector at Slough, to be sung on the New Year's Eve, 1839—40, *by Papa, Mama, Madame, and all the Little Bodies in the tube thereof assembled:—*

In the old Telescope's tube we sit[11],
And the shades of the past around us flit;
His requiem sing we, with shout and with din,
While the old year goes out, and the new one comes in.
Chorus of youths and virgins.
Merrily, merrily, let us all sing,
And make the old Telescope rattle and ring.

Full fifty years did he laugh at the storm,
And the blast could not shake his majestic form;
Now prone he lies, where he once stood high,
And search'd the deep Heavens with his broad bright eye.
Merrily, merrily, &c.

There are wonders no living wight hath seen,
Which within this hollow have pictured been;
Which mortal record can ne'er recall,
And are known to Him only who makes them all.
Merrily, merrily, &c.

Here watched our father the wintry night,
And his gaze hath been fed with pre-Adamite light;
While planets above him, in circular dance,
Sent down on his toils a propitious glance.
Merrily, merrily, &c.

He has stretched him quietly down at length
To bask in the star-light his giant strength;
And Time shall here a rough morsel find,
For his steel-devouring teeth to grind.
Merrily, merrily, &c.

He will grind it at last, as grind it he must,
And its brass and its iron shall be clay and dust;
But scathless rays shall roll away,
And nurture its frame in its form's decay.
Merrily, merrily, &c.

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[11] The diameter of the tube is 4 ft. 10 inch. That of Lord Rosse's is 8 feet.—*Author.*

A new year dawns, and the old year's past,
  God send us a happy one, like the last;
A little more sun, and a little less rain,
  To save us from cough and rheumatic pain.
        Merrily, merrily, &c.

God grant that its end this group may find
  In love and in harmony fondly joined;
And that some of us, fifty years hence, once more
  May make the old Telescope's echoes roar.

Chorus fortissimo.
Merrily, merrily, let us all sing,
And make the old Telescope rattle and ring.

In July, 1786, the Earl of Stanhope bequeathed 500*l.* to the Society. He had been elected a Fellow in 1735, and appears to have taken considerable interest in the Society. It is worthy of mention, that on the 9th November, 1786, Miss Caroline Herschel sent a Memoir to the Society, announcing her discovery of a comet: and in 1795, this lady discovered the periodic comet now known by the name of *Encke's Comet.*

On the 26th January, 1789, the Society were honoured by adding the Prince of Wales, and the Dukes of York and Cumberland, to their list of Fellows. At the ensuing ordinary Meeting, the President announced that "H.R.H. the Prince of Wales, having been pleased to dispense with the formalities that have been adopted on similar occasions, had honoured him with his commands to attend at Carlton House with the Charter-book, when H.R.H. and their R.H.H. the Dukes of York and Cumberland, being together, were graciously pleased to sign their names in it." The King's restoration to health, after his long illness, was an event which could not pass unnoticed by the Society; who, upon the proposition of the President, resolved that congratulatory addresses should be presented to his Majesty and the Queen. That to the King was as follows :—

"We, your Majesty's most dutiful and loyal subjects, the President, Council, and Fellows of the Royal Society, beg leave to offer our cordial and most sincere congratulations to your Majesty, on the restoration of your health; for which gracious dispensation of Providence we return our humble thanks to the Supreme Disposer of all events.

"The flourishing and opulent state of the kingdom, and the unrivalled excellence which our agriculture and manufactures have attained, evince the wisdom and goodness of your Majesty's reign; whilst the grief which pervaded all ranks of persons during your Majesty's late illness, and the universal joy expressed on your recovery, shew that your people are duly sensible of the blessings they enjoy.

"But your Majesty's faithful subjects of the Royal Society, besides the advantages they reap in common with the other members of the community from your Majesty's mild and equitable government, have the further reason to rejoice at your happy recovery, that your Majesty has always deigned to bestow particular attention upon those sciences, for the promotion of which the Royal Society was instituted. By your Royal Patronage they have been encouraged, and by your bounty advanced, in a manner that adds splendour to the present age, and ensures to your Majesty the gratitude of posterity.

"It is our fervent wish that your Majesty may enjoy a long and prosperous reign, for the happiness of your people, and the general benefit of mankind."

The King, we are informed, received the Address "in the most gracious manner."

In 1788, the Linnean Society was founded under the auspices of Sir James Edward Smith[12], Sir Joseph Banks, Dr. Goodenough (Bishop of Carlisle), and other Fellows of the Royal Society. This event merits more than a mere passing record, as presenting the first instance of a subdivision of *scientific* labour in the metropolis, by the establishment of a distinct association under Royal Charter. The first volume of the *Transactions* of the Linnean Society contains an introductory discourse by Sir James, then Dr. Smith[13], which gives us some account of the principal reasons which led to the establishment of the new Society:—

"It is altogether incompatible," says the Doctor, "with the plan of the Royal Society, engaged as it is in all the branches of philosophy, to enter into the minutiæ of natural history; such an institution, therefore, as ours is absolutely necessary, to prevent all the pains and expense of collectors, all the experience of cultivators, all the remarks of real observers, from being lost to the world........Besides an attention to natural history in general, a peculiar regard to the productions of our own country may be expected from us. We have yet much to learn concerning many plants, which authors copy from one another as the produce of Great Britain, but which few have seen; and our animal productions are still less understood. Whatever relates to the history of these, their economy in the general plan of nature, or their use to man in particular, is a proper object for our enquiries. Of the productions of our own country we ought to make ourselves perfectly masters, as no natural object can anywhere be studied half so well as in its native soil. But is it not a reproach to the naturalists of Great Britain that so many rarities should remain in their hands undescribed? that foreigners should eagerly catch at one or two plants obtained from our gardens, which we for years have been trampling under foot unnoticed? yet how, till now, could such nondescripts have been made public? Large works in natural history are expensive, and of hazardous sale; few private people can undertake them; nor has there hitherto been any Society to which detached descriptions could be communicated.

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[12] Sir James Edward Smith was born at Norwich in 1759. He was intended for some mercantile calling, but from his love of science was induced to study medicine, for which purpose he proceeded to Edinburgh in 1781, and in the following year obtained Dr. Hope's gold medal for botany. He took his medical degree at Leyden, after which he travelled on the Continent for some time. Though he removed to London with the intention of practising his profession, it seems never to have seriously occupied his attention. In 1785, he was elected a Fellow of the Royal Society. In 1792, he had the honour to be engaged to teach botany to Queen Charlotte and the Princesses. He continued to reside in London until 1796, when he removed to Norwich, but paid a yearly visit to London, when he gave courses of lectures on botany at the Royal Institution. He died on the 17th March, 1828. His fame chiefly rests on his having founded the Linnean Society, and being the purchaser of the celebrated collections of Linnæus.

[13] He was knighted by the Prince Regent at a levee in 1814, on the occasion of presenting a copy of the *Transactions* of the Society.

" A kind of knowledge which naturalists have a right to expect from us in a superior degree, is the accurate determination of the species described by Linnæus, and, indeed, those of many other authors. Our access to several original collections, to the immense herbarium of Sir Joseph Banks, which contains the entire collections of several celebrated botanists, but more especially to the very herbarium and museum of Linnæus himself, must give us a means of knowledge not to be had elsewhere. A train of events, which I cannot help calling most fortunate, having brought into my hands every thing which Linnæus possessed relating to natural history or medicine, his entire library, manuscripts, and the correspondence of his whole life, as well as all the acquisitions made by the younger Linnæus, in his tour through Europe, will be a never-failing resource to us in every difficulty, as well as a fund of information, not easily to be exhausted[14]. For my own part, I consider myself a trustee of the public. I hold these treasures only for the purpose of making them useful to the world and natural history in general, and particularly to this Society, of which I glory in having contributed to lay the foundation, and to the service of which I shall joyfully consecrate my labours, so long as it continues to answer the purposes for which it is designed[15]."

On the 31st January, 1793, Alexander Volta's letters to Cavallo, "On the Irritation of Nerves and

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[14] The circumstances under which Sir James became possessed of these collections, are worth recording. After his arrival in London, while yet a young student, he happened to be breakfasting with Sir Joseph Banks, from whom he learnt that the whole of the collection of books, manuscripts, and natural history of Linnæus, had been offered him for one thousand guineas, but that he intended to decline it. Sir James immediately determined upon becoming himself the purchaser, although he had no immediate funds for the purpose. His father at first refused, but afterwards consented to the purchase. The collection arrived in London in twenty-six cases in 1784, and cost 1088*l.* 5*s.* The ship conveying it had just sailed when the King of Sweden, Gustavus III., who had been absent in France, returned home, and sent a vessel to the Sound to incercept its voyage, but, happily, it was too late. On the death of Sir James, this celebrated collection was purchased by the Linnean Society, in whose possession it still remains.

[15] P. 55.

Muscles produced by Electric Conductors," were read. They contained the first announcement of his discovery of the developement of electricity in metallic bodies. Galvani had given the name of animal electricity to the power which caused spontaneous convulsions in the limbs of frogs, when the divided nerves were connected by a metallic wire. Volta, however, saw the true cause of the phenomena described by Galvani. Observing that the effects were far greater when the connecting medium consisted of two different kinds of metal, he inferred that the principle of excitation existed in the metals, and not in the nerves of the animal; and he assumed that the exciting fluid was ordinary electricity, produced by the contact of the two metals; the convulsions of the frog consequently arose from the electricity thus developed passing along its nerves and muscles.

It may appear remarkable that Volta, an Italian Professor, should have selected the Royal Society of England as the medium of communicating this great discovery to the scientific world. The fact, however, admits of this explanation: first, that France at this period was separated from all other countries by war[16]; and secondly, that when Volta visited England in 1782, he formed the acquaintance of Sir Joseph Banks, by whom he was introduced to the most distinguished philosophers in the country, and for whom he entertained feelings of strong friendship. He was elected a foreign Member of the Society in 1791. This discovery gave rise to others, which eventually led him, in 1800, to invent what is now called the Voltaic pile, or compound Galvanic circle.

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[16] See *Biog. Univ.* Art. *Volta.*

The Paper communicating this invention, was also sent to the Royal Society, and is printed in the 90th volume of the *Transactions*, in the form of two letters to Sir Joseph Banks.

"The term animal electricity," says Dr. Whewell, "has been superseded by others, of which *Galvanism* is the most familiar; but I think that Volta's office in this discovery, is of a much higher and more philosophical kind than that of Galvani; and it would on this account be more fitting to employ the term *Voltaic electricity,* which indeed is very commonly used, especially by our most recent and comprehensive writers. The *Voltaic pile* was a more important step in the history of electricity than the Leyden jar had been[17]."

The Royal Society were not slow to recognise Volta's merits. In 1794, he was awarded the Copley Medal. At the Anniversary, Sir Joseph Banks, in his Address, said:—

"The experiments of Professor Galvani, until commented upon by Professor Volta, had too much astonished, and, perhaps, in some degree, perplexed many of the learned in various parts of Europe. To Professor Volta was reserved the merit of bringing his countryman's experiments to the test of sound reasoning and accurate investigation; he has explained them to Dr. Galvani himself and to the whole of Europe, with infinite acuteness of judgment and solidity of argument; and through the medium of the *Philosophical Transactions* he has taught us, that the various phenomena which presented themselves under the modifications of Dr. Galvani's experiments hitherto tried, are wholly owing to the excessive irritability of the nerves when subjected to the action of portions of the electric fluid, too minute to be discovered, even by the delicate electrometer of our ingenious brother, Mr. Bennet, of Worksworth; and he has detected in the metals, which Dr. Galvani considered as mere agents in conducting his animal electricity, that very existing principle which the Doctor and his followers had overlooked[18]."

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[17] *History Inductive Sciences,* Vol. III. p. 85.

In 1795, the Library of the Society received a very valuable present of Oriental Manuscripts from the celebrated Sir William Jones, who in 1792, addressed the following letter to Sir Joseph Banks:—

"*Gardens, near Calcutta, January* 29, 1792.

"MY DEAR SIR JOSEPH,

"I ANNEX a bill of lading, which will explain itself: should I live to have the pleasure of seeing you again, you will have the goodness to let me take the MSS., with the care of which I now trouble you; should I die, you will deposit them in the library of the Royal Society, so that they may be lent out without any difficulty to any studious men who may apply for them. I am so busy at this season, that I can only bid you farewell, from

Dear Sir Joseph,
Your ever faithful
"WILLIAM JONES."

Sir William died at Calcutta on the 27th April, 1794. As soon as the intelligence reached England, Sir Joseph Banks acquainted Lady Jones with the wishes of her deceased husband respecting the MSS., which were accordingly deposited in the Society's library, and to which a very valuable addition was made in 1797, by Lady Jones presenting "a large collection of Sanscrit, and other Oriental Manuscripts, collected by her late husband in India[19]."

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[18] Journal-book, Vol. xxxv. p. 372.

In 1794 a bequest of 1200*l.* was made to the Society by Sir Clifton Wintringham[20], one of its Fellows, under the subjoined conditions:—

COPY OF A CLAUSE IN SIR CLIFTON WINTRINGHAM'S WILL RELATING TO THE ROYAL SOCIETY.

"I GIVE, devise, and bequeath, the sum of twelve hundred pounds in the three per cent. Consolidated Bank Annuities, now standing in my name in the books of the Governor and Company of the Bank of England, unto a Society commonly called and known by the name of The Royal Society of London, and their successors for ever, on trust, payable and to be paid to them, or their assigns, twelve calendar months next after the decease of Dame Ann Wintringham aforesaid, or of me, if the survivor of her, to receive and take the interest, dividends, and annual produce thereof, after the same shall commence and be payable for the uses, and upon the trust, and with, and under, and subject, and liable to the powers, provisoes, limitations, and directions hereinafter provided, limited, and declared concerning the same; (that is to say) it is my will and meaning, and I do hereby direct, that they, the said Royal Society for the time being, after the first payment of the said interest, dividends, and annual produce has been in manner as is abovesaid so made to, and received by them or their assigns, do, in each and every successive and subsequent year, at their Meeting then next to be held within the space of one calendar month from the time of the first payment as aforesaid, make choice of three subjects in Natural Philosophy, including Chemistry, as shall be proposed in writing by their President for the time being, for an Experimental Examination thereof. And I further will and direct that such choice shall be made by a plurality of votes of the Members present taken by secret ballot, and such choice from amongst the three so proposed being so made, I will and direct that they cause it to be advertised by their President, or his Depute, for the time being, in some of the publick newspapers of London, Paris, and the Hague, setting forth in the said advertisement the subject so proposed and chosen as is abovesaid. And that a silver cup, gilt on the inside, of the full value of thirty pounds of lawful money of Great Britain, shall be presented and given in the name and by the authority of the said Royal Society, by the President thereof, or his Depute, for the time being, to such person who shall by a majority of the votes of the Members who compose for the time being the Council of the Royal Society, taken by secret ballot, be declared to have presented, and in writing to have transmitted to their President for the time being, or his depute, the best, the most accurate, and the most satisfactory Experimental Examination of the said subject for the time being so proposed, either in the English or Latin language, in the space of ten calendar months next ensuing the publication of the said advertisement for the time being. And I will and direct that in the said advertisement there be given proper notice that *ten* copies[21] of the Experimental Examination as made by him on the subject so proposed and chosen as aforesaid for the time being, are to be sent and transmitted under a cover inscribed with a motto, together with another cover inscribed with the same motto, and under it the word private, containing under the same cover the name of the author of the said Experimental Examination, and the whole to be inclosed within a cover addressed to the President of the said Royal Society in London for the time being, and who, reserving one of the said copies for his own perusal and examination, is to transmit all the other copies without delay successively to the respective Members of the Council for the time being appointed for the examination thereof as aforesaid, reserving, however, all the covers inscribed private to a future time, as is hereafter declared for that purpose. And I will and direct that such determination and choice being made by a majority of the Examiners as abovesaid, taken by secret ballot, and by which preference is adjudged to a particular Experimental Examination of the subject proposed as is abovesaid, for examination for the time being, that the said President, or his Depute, for the time being, shall, within ten days from such choice, expend part of the said interest, dividends, and annual produce, in the purchase of a silver cup, gilt on the inside, of the full value of thirty pounds of lawful money of Great Britain; and being in possession thereof, I will and direct that proper notice be transmitted by the said President, or his Depute, for the time being, to the author of the said approved Experimental Examination, agreeable to the address as signified by the motto inscribed private, corresponding therewith, setting forth in the said notice that if he, or his proper Depute, will attend at a Meeting of the said Royal Society in London on the last Thursday in the month of December next ensuing the said notice, the silver cup as is abovesaid will then be presented and given to him, or his Depute properly authorized for that purpose, by the President of the said Royal Society, or his Depute, for the time being. And I will and direct that the following inscription, (with the said author's christian name, and family surname, with such other adjuncts and appellations as his rank, dignity, or profession, may entitle him to bear, being previously engraved thereon), shall be added:—

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[19] Council-minutes, Vol. VIII. p. 104.

[20] Sir Clifton Wintringham was born at York in 1710. His Father (also a F.R.S.) practised as a physician in that city, and published several works which have obtained for him a reputation both as a physician and physiologist. His son followed his father's profession, and after completing his education at Trinity College, Cambridge, where he took his degree of M.D., settled in London. His progress was rapid. The same year that he arrived in London, he was appointed physician to the Duke of Cumberland, and in 1762, was made physician to George III., by whom he was knighted. In 1759, he was made physician-extraordinary, and subsequently physician-general to the army; and was created a baronet in 1774. He published various medical essays and an edition of his father's works. He had an extensive practice, and was much respected both in public and private life. His death occurred at Hammersmith on the 9th January, 1794. *Dict. Hist. de la Médecine. Gen. Biog. Dict.*

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[21] *Sic* in original.

Viro . . . . .
Poculum hoc adjudicavit
Societas Regia Londonensis
Ex Testamento
CLIFTON WINTRINGHAM, Baronetti, M.D., &c. &c. &c.

To which, let the year of our Lord, &c. be added; and on the reverse, the subject of the Experimental Examination for the time being. And I further will and direct that the surplus of the said interest, dividends, and produce so bequeathed as abovesaid, and not expended in the purchase of the said engraved cup for the time being, be applied towards defraying the charge or charges on the publication of the advertisements aforesaid. `And I will and direct that all the other covers inscribed private remain unopened, and are together with the said respective *Examinations* to be delivered to their several claimants, on the producing the motto and the seal corresponding to and with such unopened covers; otherwise at the expiration of six calendar months from the presentment of the said silver cup, I will and direct all such remaining unclaimed covers, and all such Experimental Examinations, be publicly, by the President of the Royal Society, or his Depute, for the time being, committed to the fire. And I will and direct that they, the said Royal Society, do in each and every year successively, proceed to act and observe all the directions in the same order, manner, and form, as is abovesaid for evermore. Provided always, nevertheless, that if at any time or times there shall be any failure made in there being no Experimental Examination transmitted as is abovesaid on the subject for the time being, as has been published in the advertisements for the time being, or not any one so as to merit the approbation of a majority of the Examiners of the Council of the Royal Society for the time being, taken by secret ballot as is abovesaid, then and as often as such failure shall so happen, I will and direct that all the said interest, dividends, and annual produce so devised and bequeathed to them on trust, and allotted for the purchase of the said silver cup for the time being, as is abovesaid, shall go, and be payable, and paid, by the President of the said Royal Society, or his Depute, or assigns, for the time being, to the Governors and Guardians of an Hospital, known by the name of the Foundling Hospital, in Lambs Conduit Fields, and their assigns, on trust, that they the said Governors and Guardians for the time being do in each and every year as such failure shall so be made as is abovesaid, receive and take either by themselves, or their proper assigns, the interest, dividends, and annual produce from the President of the said Royal Society, his or their proper assigns for the time being, and apply the same for such uses and purposes as to them shall seem most meet and conducive towards carrying on the charitable institution and intents of the said Hospital, for or during the term and number of years as such failure shall so be made, any thing before contained to the contrary thereof in any wise notwithstanding[22]."

The subsequent history of this bequest is rather curious. Lady Wintringham died intestate, on the 19th January, 1805, and letters of administration were taken out by Clifton Wintringham Loscombe, Esq. At this period it is evident that the bequest should have reverted to the Society, but Mr. Loscombe did not pay it over as the Will of Sir Clifton Wintringham prescribed; and it was only in 1839, when Mr. Loscombe's affairs were being settled, that his attorneys applied to the Society, asking whether they had duly received the 1200*l.*

The business of claiming, for the purpose of recovery, was put into the hands of the Society's solicitors, but no sooner was the claim advanced, than the Foundling Hospital set up a counter claim, on the grounds that the dividends, not having been applied according to the terms of the bequest, necessarily lapsed to the Hospital.

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[22] This will was proved at London 23d January, 1794, by Dame Ann Wintringham, widow, the relict of the deceased; Charles Mellish, Esq., Benjamin Loscombe, Esq., and Tobias Stapleton, Esq., the executors.

A tedious law-suit followed, which was at length terminated by a compromise to the effect, viz. "That the 1200*l.* Consols should be transferred to, and six years' dividends be received by, the Royal Society, and that out of these and the accruing dividends, 100*l.* and the costs of the Foundling Hospital should be paid, also the costs of the Attorney-General, and those of the Society." This compromise, which met the approval of Council, and the sanction of the Master of the Rolls, was effected in 1842.

Although appertaining more to the scientific than to the civil history of the Society, we may notice here the physiological labours of Sir Everard Home, which appear in the extraordinary number of 110 Papers, published in the *Philosophical Transactions*, extending over the years 1785 to 1830[23]. The Memoirs are profusely illustrated by splendid plates[24], engraved at a cost to the Society of some thousands of pounds. This circumstance alone deserves record, as evincing great liberality on the part of the Council, and a deep anxiety to advance the sciences of physiology and anatomy. The *Lectures on Comparative Anatomy*, in six volumes quarto, bearing Sir Everard's name, consist chiefly of a reprint of these Papers, and of the plates illustrating them, by permission of the Society.

In 1796, the Society acquired additional means of advancing and rewarding scientific investigations, by Count Rumford's princely endowment. Before entering on this, it will not be out of place to say a few words respecting this gentleman, to whom science is so largely indebted. Benjamin Thompson, afterwards Count Rumford, was born in 1753, at a village in New Hampshire, then called Rumford, and now Concord. He was employed in early life as a teacher, but having married a lady of some property, this occupation became no longer necessary for his maintenance. He next entered the militia, and when the American war commenced, had attained the rank of Major. For his services to the King's cause, he subsequently obtained, when in England, an appointment in the Foreign Office. Meanwhile, in 1773, he secretly quitted his residence, from motives of safety, leaving his wife, whom he never saw again, and his infant daughter, who joined him twenty years later, in Europe. He was subsequently employed to raise a regiment for the King's service; but on the evacuation of Boston, in 1776, received orders to convey some important despatches to England, where he acquired the confidence of Lord Germaine, then Colonial Secretary, who appointed him Secretary of the province of Georgia. It does not appear that he exercised this office, but he remained attached to that department of public service.

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[23] He received the Copley Medal in 1807. See *Proceedings*, Vol. III. p. 145.

[24] It is curious to contrast these with those illustrating Cuvier's *Anatomie Comparée*, which are in the coarsest style of art.

In 1777, he commenced his career as an experimental philosopher, by employing his leisure hours, during a visit to Bath, in making experiments on the cohesive strength of different substances. Upon his return to London, he communicated them to Sir Joseph Banks, with whom he formed an intimate acquaintance, which he kept up throughout the remainder of his life. In 1779 (not 1778, as is stated by his biographers) he was elected a Fellow of the Royal Society. His certificate describes him as "a gentleman well versed in natural knowledge and many branches of polite learning." In 1780, he was appointed under-Secretary of State, and we find him constantly employed, for some time, in the office on war business. Having raised a regiment of Dragoons in America, he went there to assume the command as lieutenant-colonel, and served with considerable success, until 1783, when he returned to England, and having been knighted, obtained leave to enter the service of the Elector of Bavaria, who created him chamberlain, privy councillor, and Count of the Holy Roman Empire. It would far exceed our limits to give even an outline of the many useful undertakings which he carried out in Bavaria[25]. They will be found detailed in his *Essays*. In 1795, he visited England and Ireland, for the purpose of introducing some of his political economy reforms, and was received everywhere with great attention. In Ireland he was of essential service in the arrangement of several of the public institutions of that country; and on leaving, received the thanks of the grand jury of the county of Dublin, of the Lord Mayor of that city, and of the Lord Lieutenant. On his return to London, he established the prize at the Royal Society, as well as one in the American Academy of Sciences, for discoveries relating to heat and light. "He was one of the first promoters, if not the original proposer, of the Royal Institution. Many of his experiments on the properties and economical distribution of heat, which are known in all the countries of Europe, by their useful application, and many of his philanthropic schemes for the alleviation of distress in times of scarcity, were devised and executed in this school of science[26]." He was recalled to Bavaria in 1797, where, after the battle of Friedberg, he was left in command of the army, and on the Elector's return, was placed at the head of the Bavarian Police. His exertions in this office impaired his health so seriously, that retirement became necessary, and he was accordingly sent to London in the capacity of envoy extraordinary and minister plenipotentiary, but being a subject of the King of Britain, it was judged that he could not hold these offices : and he therefore continued to live in England as a private individual, enjoying a pension of 1200*l*. a-year from the King of Bavaria. The temptation of a better climate induced him, in 1802, to remove to Paris, where he married the widow of Lavoisier, but soon afterwards separated from her. His latter years were spent in great retirement, at Auteuil, near Paris, where he died, on the 21st August, 1814. His communications to the *Transactions*, and other scientific publications, are extremely numerous; they are principally on subjects relating to light and heat, which occupied his attention for many years[27].

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[25] The beautiful English gardens at Munich were laid out by him.

This brief sketch of the life of Count Rumford will render his letter to Sir Joseph Banks more interesting :—

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[26] On the rise and progress of the Royal Institution, in the 3rd volume of the *Journal of Science and Arts*, p. 6.

[27] Rumford's stove or fire-place is well known. One of the earliest is that, set up under the Count's immediate superintendence, in my office at the Royal Society. It is by far the best fire-place which I have seen.

"Sir, "*London*, 12 *July*, 1796.

"Desirous of contributing efficaciously to the advancement of a branch of science which has long employed my attention, and which appears to me to be of the highest importance to mankind, and wishing at the same time to leave a lasting testimony of my respect for the Royal Society of London; I take the liberty to request that the Royal Society would do me the honour to accept of one thousand pounds stock in the funds of this country, which I have actually purchased, and which I beg leave to transfer to the President, Council, and Fellows of the Royal Society, to the end, that the interest of the same may be by them and by their successors, received from time to time for ever, and the amount of the same applied and given once every second year, as a premium to the author of the most important discovery, or useful improvement, which shall be made or published by printing, or in any way made known to the public, in any part of Europe during the preceding two years, on Heat, or on Light; the preference always being given to such discoveries as shall, in the opinion of the President and Council, tend most to promote the good of mankind.

"With regard to the formalities to be observed by the President and Council, in their decisions upon the comparative merits of those discoveries which, in the opinion of the President and Council, may entitle their authors to be considered as competitors for this biennial premium, the President and Council of the Royal Society will be pleased to adopt such regulations as they in their wisdom may judge to be proper and necessary.

"But, in regard to the form in which this Premium is conferred, I take the liberty to request that it may always be given in two medals, struck in the same die, the one of gold, and the other of silver, and of such dimensions that both of them together may be just equal in intrinsic value to the amount of the interest of the aforesaid one thousand pounds stock during two years; that is to say, that they may together be of the value of Sixty Pounds sterling.

"The President and Council of the Royal Society will be pleased to order such device or inscription to be engraved on the die, that they shall cause to be prepared for striking these medals, as they may judge proper.

"If during any term of years reckoning from the last adjudication, or from the last period for the adjudication of this Premium by the President and Council of the Royal Society, no new discovery or improvement should be made in any part of Europe relative to either of the subjects in questions (Heat or Light), which in the opinion of the President and Council shall be of sufficient importance to deserve this premium, in that case it is my desire that the premium may not be given, but that the value of it may be reserved, and being laid out in the purchase of additional stock in the English funds, may be employed to augment the capital of this premium. And that the interest of the same, by which the capital may from time to time be so augmented, may regularly be given in money, with the two medals, and as an addition to the original premium at each such succeeding adjudication of it. And it is further my particular request, that those additions to the value of the premium arising from its occasional non-adjudication, may be suffered to increase without limitation.

"With the highest respect for the Royal Society of

London, and the most earnest wishes for their success in their labours for the good of mankind,

"I am, &c.

"RUMFORD.

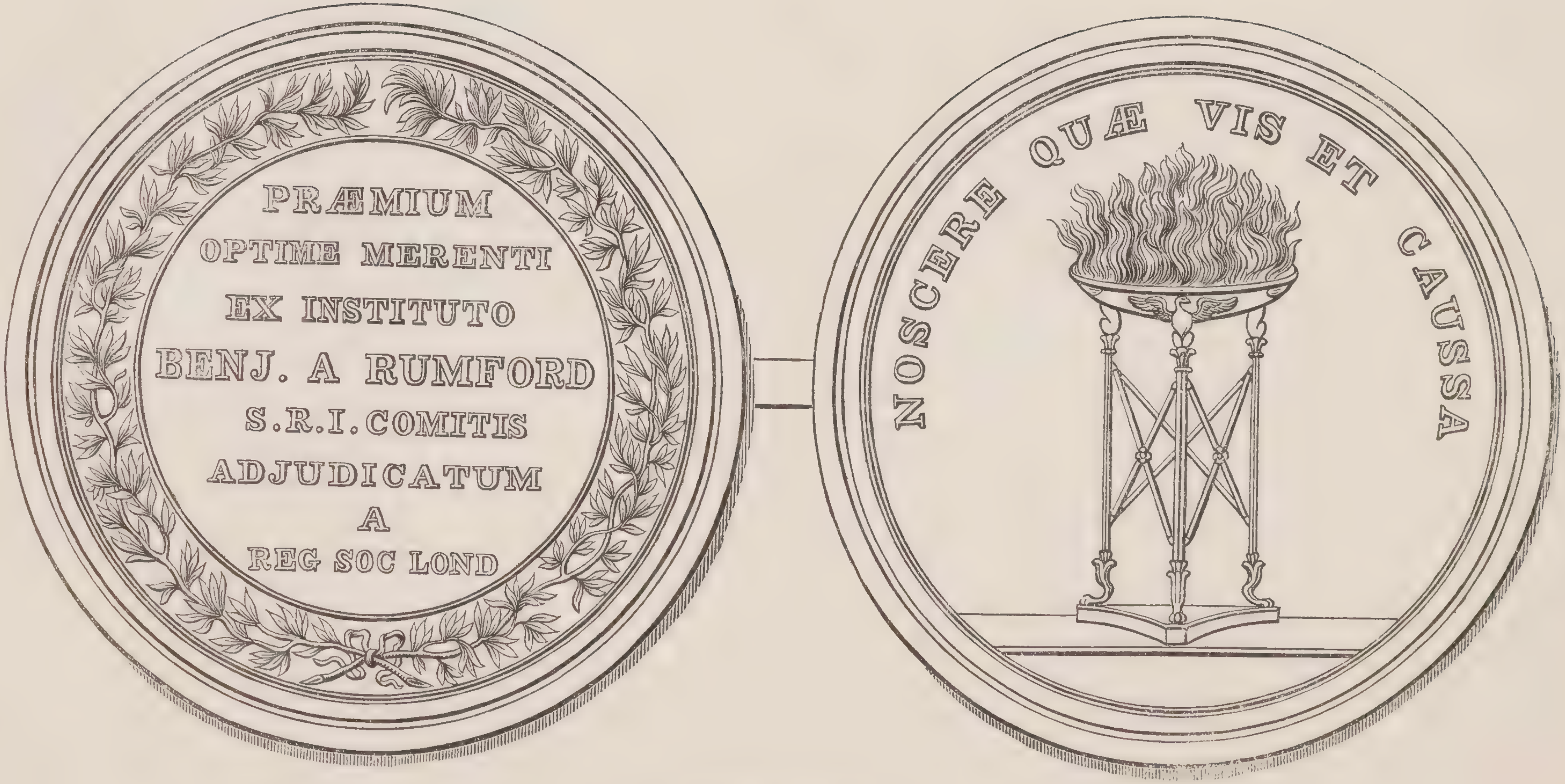
"*Sir Joseph Banks, Bart., K.B., P.R.S., &c. &c. &c.*"

The Society did not hesitate to accept this munificent present: Sir Joseph Banks was requested by the Council to return their sincere thanks to Count Rumford; and, at the same time, to inquire how far improvements, or discoveries, in optics and chemistry, might come under the Count's views. This elicited a second communication:—

"MY DEAR SIR, "*Munich, April* 20, 1797.

"IN your last letter, you expressed a wish that I would write to inform you how far, in my opinion, discoveries in Optics, and improvements in Chemistry by the agency of fire, ought to be considered as being so connected with light or heat, as to be taken into consideration in the adjudication of the premium I have founded for encouraging the investigation of those branches of philosophical enquiry, and improving the useful arts which depend on them. Though I am quite willing to leave this question to the decision of the Royal Society, and shall certainly be perfectly satisfied with whatever they may determine respecting it, either as a general regulation, or in any particular case which may occur; yet, as you have done me the honour to call on me for my opinion, I think it my duty to comply with your request by communicating to you my ideas on the subject.

"I think that the premium should be limited to new discoveries tending to improve the theories of Fire, of Heat, of Light, and of Colours; and to new inventions



Rumford Medal.

Size of Original.

and contrivances, by which the generation and preservation and management of heat and of light may be facilitated. In as far, therefore, as chemical discoveries or improvements in optics answer any of those conditions, they may, I think, fairly be considered as being within the limits assigned to the operation of the premium. The objects, however, which I had more particularly in view to encourage, are such practical improvements in the generation and management of heat and of light as tend directly and powerfully to increase the enjoyments and comforts of life, especially in the lower and more numerous classes of society.

"I am, &c.

"RUMFORD.

"*Sir Joseph Banks, Bart., K.B., P.R.S., &c. &c. &c.*"

Prior to the date of the foregoing letter, a Committee, consisting of Sir C. Blagden, Mr. Planta, and Dr. Combe, was appointed, "to consider and report upon a design for a medal[28]." Subsequently, Sir Joseph Banks, Dr. Gray (Secretary), and Count Rumford, who had been chosen into the Council, were added to the Committee, who delivered in the following Report, on the 4th April, 1799 :—

"Resolved: That the device on the obverse be a tripod with a flame upon it[29]. And that the inscription round the same be part of the 773rd verse of the V. Book of Lucretius, (*De Rerum Natura*):

'*Noscere quæ vis et causa.*'

"That the inscription on the reverse be as follows:

'*Præmium optime merenti ex instituto Benj. a Rumford, S.R I. Comitis: adjudicatum a Reg. Soc. Lond.*'

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[28] Council-minutes, Vol. VIII. p. 102.

[29] This device was suggested by Mr. Smirke.

"That the diameter of the Medal do not exceed three inches.

"That Mr. Milton be employed in sinking the dies of the said Medal."

The Council approved this Report, and resolved to carry the resolutions therein contained into immediate execution. It was not, however, until the 2nd April, 1802, that impressions from the dies, by Milton, were laid before the Council; these "were approved, and orders were given for striking one gold and one silver medal from the same, according to the regulations prescribed by the Council[30]." It must have been particularly gratifying to the Council, and to Count Rumford, that the first adjudication of the new prize should have been in favour of the founder. On the 11th November, 1802, the Minutes of Council state, that "the allotment of the gold and silver medals on Count Rumford's foundation was taken into consideration, and the letter respecting his donation was read, and it appearing that no discovery lately published, on the subject to which they are limited, is of equal merit with those of the Count himself, it was unanimously resolved, by ballot, that the said medals be given to Benjamin Count Rumford, for his various discoveries on the subject of heat and light."

In consequence of several years having now elapsed, during which no award was made, the Rumford fund has increased (by funding the accruing dividends), from 1000*l*. to 2430*l*., which is its amount at present (1848). Thus the recipient of the prize, in accordance with Count Rumford's wishes, obtains two medals, one gold, of the value of 60*l.*, the other silver, of the value of 4*l.*, and the balance in money, amounting to about 80*l.*

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[30] The cost of sinking the dies was 105*l*., which sum was paid out of the funds of the Society.

Though but of minor importance, it may be proper to state, that in 1797, John Symmons, Esq., F. R. S., presented the Society with a very handsome and massive silver-gilt inkstand, which is placed on the table in front of the President, at the Ordinary and other Meetings.

On the 21st June, 1798, Mr. Cavendish's Paper, *Experiments to determine the Density of the Earth*, was read. These experiments are of so remarkable a nature as to deserve a brief description of them, particularly as they are connected with those made by Dr. Maskelyne for the same purpose[31].

"Many years ago," says Mr. Cavendish, "the late Rev. John Michell, of this Society, contrived a method of determining the density of the earth, by rendering sensible the attraction of small quantities of matter; but as he was engaged in other pursuits, he did not complete the apparatus till a short time before his death, and did not live to make any experiments with it. After his death the apparatus came to the Rev. Francis Wollaston, who, not having conveniences for making experiments with it in the manner he could wish, was so good as to give it to me.

The apparatus is then described as consisting of "a wooden torsion-rod 6 feet long, suspended horizontally by a slender wire 40 inches long, to each extremity of which was hung a leaden ball, about 2 inches in diameter; the whole was inclosed in a narrow wooden case, to defend it from currents of air. The weights which Mr. Michell intended to use as the disturbing or attracting masses were 8 inches diameter. One of these was to be placed on one side of the case, opposite to one of the balls, and as near it as could conveniently be done, and the other on the other side, opposite to the other ball, so that the attraction of both these weights would conspire to turn the arm (torsion-rod) aside; and when its position, as affected by these weights, was ascertained, the weights were to be removed to the other side of the case, so as to draw the arm the contrary way; and the position of the arm was to be again determined; and consequently, half the difference of these positions would shew how much the arm was drawn aside by the attraction of the weights. In order to determine from hence the density of the earth, it is necessary to ascertain what force is required to draw the arm aside through a given space. This Mr. Michell intended to do by putting the arm in motion, and observing the time of its vibrations, from which it may easily be computed[32]."

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[31] Mr. Galloway has had the kindness to give these pages the benefit of his revision.

Cavendish was so firmly persuaded of the necessity for guarding against all variations of heat and cold, that he determined on placing his apparatus in a room constantly closed, and observing the motion of the torsion-rod from without, by means of a telescope, taking care to suspend the leaden weights in such a manner that he could move them without entering the room. The propriety of adopting these precautions will be understood when it is borne in mind, that the $\frac{1}{50,000,000}$ of the weight of the balls was sufficient to attract them[33].

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[32] *Transactions* for 1798, p. 470. Mr. Cavendish adds in a note, that "Mr. Michell communicated to him his intention of making these experiments, before those by M. Coulomb were published."

Cavendish has described seventeen sets of experiments; and we have it on the authority of Mr. Baily, "that no further account of any subsequent experiments is on record, and no trace of any new light on the subject can be found amongst Cavendish's papers[34]." It is remarkable, however, that the experiments by Cavendish are very accordant, "shewing," as Mr. Baily observes, "the diligence and care with which they have been made." From the seventeen sets of experiments he deduced twenty-nine results, from the mean of which he computed the density of the earth to be 5·45.[35]

It is evident that Cavendish was not satisfied with the conclusions at which he had arrived. In his Paper he writes, "According to the experiments made by Dr. Maskelyne, the density of the earth is 4½ times that of water; which differs rather more from the preceding determination than I should have expected. But I forbear entering into any consideration of which determination is most to be depended on, till I have examined more carefully how much the preceding determination is affected by irregularities whose quantity I cannot measure." Mr. Baily, in his review of

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[33] Cavendish made his experiments in an outhouse in his garden, at Clapham Common.

[34] Baily, *On the Density of the Earth*, Vol. XIV. *Astron. Society Memoirs.*

[35] In the paper the figures are, 5·48, but Mr. Baily has shown clearly that Cavendish made a singular arithmetical error in his computation, and that the decimals should be 45. See his Paper in the 14th volume of the *Memoirs of the Astron. Society*, p. 90.

Cavendish's experiments, says, that "they have justly obtained considerable celebrity and confidence, not only as being the first and, till within these few years, the only attempt at the solution of this difficult problem by means of the torsion-rod, but also from the care and attention with which the experiments were conducted, as well as from the well-known talents and abilities of the author." It may be mentioned here, that in the *Transactions* for 1821, there is a Paper by Dr. Hutton, reviewing Cavendish's experiments, in which the writer endeavours to uphold the superiority of the Schehallien experiments and their reductions. But in his anxiety to do this, "he has fallen," says Mr. Baily, "into some singular errors, which have defeated his object in this respect[36]."

Though carrying us beyond our province, it would be a grave omission not to state, that the experiments made by Mr. Baily, to determine the mean density of the earth, in 1838—42, arose out of those made by Cavendish[37]. In fact, Mr. Baily tells us, that he borrowed Cavendish's apparatus from the Royal Institution, to which it belongs, for the purpose of having copies of its several parts made for his experiments. It is scarcely necessary to remark, that all the resources of modern science were carefully applied to render the apparatus employed by Mr. Baily as perfect as possible. He was, moreover, assisted and advised by his most distinguished contemporary philosophers, and received a grant of 500*l.* from Government to defray the necessary expenses.

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[36] Dr. Hutton was 84 years old when he wrote this Paper.

[37] So did the experiments made in 1836, by Mr. Reich, of Freiberg, for the same object. Mr. Reich followed Cavendish's plan in every particular, except in using one leaden mass instead of two. From 57 experiments, he deduced 5·44 for the mean density of the earth. See his work on the subject, entitled, *Versuche über die mittlere Dichtigkeit der Erde.* 8vo. Freiberg, 1838.

The fourteenth volume of the *Memoirs of the Astronomical Society*, contains an elaborate and interesting account of the manner in which the experiments were conducted. The weight of the large balls, or masses, was 380½ pounds avoirdupois, besides these Mr. Baily used a variety of small balls, of different sizes and substances, with the view of ascertaining whether the results would be affected by such a variation[38]; and two kinds of torsion-rods, with different suspensions. "The actual observations printed in the *Memoir* are 2153 in number, varying from ten to thirty minutes each; so that I am under the mark considerably, when I say, that 600 hours were spent at the apparatus, in the mere act of watching the oscillations of the torsion-rod. To this must be added nearly as many more, in the series of experiments of which the results were afterwards abandoned, on account of the anomalies of the pendulum. Add to this the time expended in contrivance, in computation, and in deliberation, and it will appear, that it is not often that any single inquiry has called forth so determined an exercise of industry and perseverance[39]." The Astronomical Society consequently awarded their gold medal to Mr. Baily in 1843. It now only remains to state the results of his experiments: taking the whole of those printed in the *Memoir*, the main result is 5·6747, and rejecting a few series considered as doubtful, the mean result would be 5·6604. "The probable error of the whole," says Sir John Herschel, "shews that the mean specific gravity of this our planet is, in all human probability, quite as well determined as that of an ordinary hand-specimen in a mineralogical cabinet,—a marvellous result, which should teach us to despair of nothing which lies within the compass of number, weight, and measure[40]." But it may not be uninteresting to give the various determinations respecting the density of the earth, made by different parties[41]. They are as follows:—

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[38] They were composed of platinum, lead, zinc, glass, ivory, and hollow brass. Their diameter was about two inches.

[39] President's Anniversary Address to the Astron. Society, 1843.

Schehallien, from Playfair's data, Mean	4·713
,, from Dr. Hutton's data	4·481
Carlini, from Pendulum on Mont Cenis	4·950
Reich, repetition of Cavendish's Experiment	5·438
Cavendish, computation corrected by Baily	5·448
Baily	5·660

Under the date of February 22, 1798, the following Minute appears in the Council-book:—

"A motion having been made for paying into the Bank the sum of 500*l.* as a voluntary contribution towards the defence of the country at this critical period, the same was put to the ballot, and unanimously agreed to."

This is powerful evidence of the patriotism pervading all ranks at that time. The contribution was actually paid into the Bank of England; and although foreign to all the objects of the Royal Society, appears to have met with the approbation of the Fellows generally.

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[40] *Memoir of Baily*, p. 26. A Paper by Mr. Hearn, of the Military College, Sandhurst, entitled, "On the Cause of the Discrepancy observed by Mr. Baily with the Cavendish Apparatus," was read before the Royal Society in March, 1847. The author endeavours to prove that the anomalies in the results arose from the magnetic state of the masses which were the subject of the experiments.

[41] It is important to state, that the apparatus used by Mr. Baily is in the possession of the Astronomical Society.

We are now drawing fast to the close of the eighteenth century, and it will not be out of place to take a brief review of the Society's financial condition. The annexed Table exhibits the Receipts and Expenditure from 1781 to 1800, inclusive, in decennial periods.

Years.	Receipts.	Expenditure.	Years.	Receipts.	Expenditure.
	£.	£.		£.	£.
1781	891	727	1791	1516	1047
1782	1101	1130	1792	1393	1121
1783	1104	958	1793	1544	1119
1784	1106	1309	1794	1809	1299
1785	1168	1337	1795	1557	1486
1786	2433[42]	1914	1796	1491	1557
1787	1486	1169	1797	1917	1730
1788	1631	1455	1798	1956	2197[43]
1789	1160	1300	1799	1342	1563
1790	1298	1318	1800	1652	1535
	13,378	12,617		16,177	14,654

Thus, it appears that the receipts increased from 13,378*l.* the aggregate of the ten years ending 1790, to 16,177*l.*, the aggregate amount of the ten years ending 1800; whilst the expenditure during the same period increased from 12,617*l.* to 14,654*l.* The principal sources of income and expenditure during the foregoing periods, were: The estates of the Society, which produced 181*l.* per annum; the dividends on stocks, during the first decennial period averaging 210*l.* per annum, during the last, 360*l.* per annum; the average sale of *Transactions*, which amounted during the first ten years to 144*l.* a-year, during the last to 250*l.* a-year; and the compositions and subscriptions amounting to 802*l.* and 826*l.* respectively.

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[42] Including Lord Stanhope's legacy of 500*l.*

[43] Including 500*l.* contribution to defray war expenses.

The expenditure was principally for printing the *Transactions*, engraving, and salaries. The average annual cost of the former, including paper, was 324*l.* from 1780 to 1790; and 527*l.* from 1790 to 1800. The salaries during the entire period of twenty years amounted annually to 391*l.*, and were thus divided: first and second Secretary 70*l.* 10*s.* each, Foreign Secretary 20*l.*, Assistant-Secretary and Librarian 220*l.*, Porter 10*l.* A large item (55*l.* a-year)[44], appears under the head of taxes, and 21*l.* was paid for the rent of a warehouse. Various other house and incidental expenses, brought the expenditure up to about 1300*l.* a-year, which, however, was 200*l.* less than the annual income of the Society. This fact, and the augmentation in price of almost all kinds of provisions, led the Council, in 1800, to augment the salaries of the officers of the Society. Before doing so, however, a Committee was appointed to consider the expediency of the measure. In their Report, presented at a Meeting of Council on the 13th March, 1800, the Committee express themselves "of opinion, that the increased value of all necessaries of life is such as will fully justify an increase of salary to the two Secretaries of 34*l.* 10*s.* each, and to the Clerk of 60*l.*[45]"

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[44] Latterly, the Act of Parliament exonerating scientific and literary Societies from all local taxes, has reduced the above amount to 21*l.*

This was approved by the Council, and the salaries of the chief Secretaries were raised to 105*l.*, and that of the Assistant-Secretary (or Clerk, as he was then styled,) to 280*l.*

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[45] So great was the rise in the price of provisions at this period, that Arthur Young, in his *Annals of Agriculture*, says, "A person is now living (1801), who, when he laboured for five shillings a week, could purchase with that five shillings a bushel of wheat, a bushel of malt, a pound of butter, a pound of cheese, one pennyworth of tobacco, which articles would now cost 1*l.* 6*s.* 5*d.*"

CHAPTER VIII.

Establishment of the Royal Institution—The Members co-operate with the Royal Society—Scientific Discoveries made at the Royal Institution communicated to the Royal Society—Numerous Scientific Committees appointed at the request of Government—Report on Gas Works—Dr. Young's Undulatory Theory of Light—Foreign Secretary—Establishment of the Society for the Promotion of Animal Chemistry—Letter from Mr. Brande—Establishment of the Geological Society—Memorial of the Royal Society respecting Greenwich Observatory—Communication from the Secretary of State—Appointment of a Committee for ascertaining the length of a Pendulum with reference to a Standard Measure—History of Standard Measures—Early Indifference of the Legislature on the subject—Standard Yard of 1758—Bill for Uniform System of Measures—Commission appointed—Captain Kater's Experiments—Reports of Commissioners—New Act of Parliament—Standard Yard destroyed—New Commission of Weights and Measures appointed—Experiments of eminent Fellows of the Society to ascertain the Figure of the Earth—Biot's gratitude to Sir Joseph Banks.

1800—20.

ON the 13th January, 1800, the Royal Institution in Albemarle Street, was incorporated[1]. This excellent association, which owes its origin to Fellows of the Royal Society, has done such good service to the cause of science, as to demand more than a mere passing notice[2]. In a Paper "On the Rise and Progress of the Royal Institution," in the third volume of the *Journal of Science and Arts*, the author relates that:—

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[1] The reader is probably aware, that in the early part of this century several scientific and literary institutions were established. It was customary, when any of these applied for a charter of incorporation, to send a copy of the petition to the Royal Society, in order that the Council might make any objection that they thought proper. In the case of the *Royal Society* of Literature, a protest was entered against the Title, which, it was conceived, would sometimes be confounded with the *Royal Society;* but matters had gone so far as to render it difficult and costly to change the appellation.

"On the first proposition for this Philosophical Association in the year 1800, one of the principal objections to it was, that it would tend to diminish the importance of our elder establishments: a practical argument against this idea we will now give, upon the experience of seventeen years, by referring principally to the annals of the Royal Society, for the record of our services. Nor will it be any disparagement to the dignity of that venerable body to shew that some of the fairest flowers of her later *Transactions* were sown and nurtured by the experimental manipulations not of a jealous rival, but of a useful and laborious ally.

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[2] Dr. Faraday has kindly communicated to me the following letter relating to the origin of the Institution.

"My dear Sir, "*Royal Institution*, 20*th March*, 1848.

"According to the earliest document I can find, the first meeting held for the purpose of founding the Institution, was on the 9th March, 1799, at the house of Sir Joseph Banks, in Soho Square. It is called a Meeting of the Managers, and there were present Sir Joseph Banks, the Earl of Morton, the Earl Spencer, Count Rumford, Richard Clark, Esq., and Thomas Bernard, Esq. These were the men; and at that meeting they made Sir Joseph Banks chairman, and Mr. Bernard secretary. The title and purposes of the Institution, as given at that time, are as follows:

"Institution, *For diffusing the knowledge, and facilitating the general introduction, of useful mechanical inventions and improvements: and for teaching, by courses of philosophical lectures and experiments, the application of science to the common purposes of life.*

"You will see that no idea of the research that grew up in the time of Young and Davy entered into the conceptions of the founders. The first meeting of the proprietors (now replaced by those we call members) took place on the 20th April of the same year.

"Ever truly yours,
"M. Faraday.

"*C. R. Weld, Esq.*"

In the Prospectus of the Royal Institution, we are told that "after mature deliberation, the word Institution was adopted for the title, being already well-known for near a century in the famous *Istituto* of Bologna."

"The history of chemical science must for ever date one of its principal epochs from the foundation of the Laboratory of the Royal Institution. The reformed doctrines of the French school were but just firmly established by the powerful engine of her nomenclature, and the expiring groans of the phlogistic hypothesis were still heard in the last writings of Dr. Priestley, when a new power of nature was developed by the experiments of Galvani, and a new and powerful instrument of research combined by the genius of Volta. The experimentalists of our school were not behind others in their investigations in the laws of Galvanism; and various were their improvements in the Voltaic apparatus, till its splendid powers were first fully displayed in giant greatness, in the battery of the Institution.

"The impulse which was given to science by these striking discoveries vibrated to every part of the civilized world, and the crowded lectures, in which such wonderful novelties were displayed with all the powers of eloquence and all the aids of a splendid apparatus, contributed not a little in this country to the rapid diffusion of a taste for philosophic inquiry.........It has ever been the boast of Great Britain, that nearly all that has been done for Science, has been effected by the exertions of individuals. Whether this is at the same time the justification of her rulers, we will not now inquire. When we look at the splendid list of noblemen and gentlemen, patrons of science and scientific men, which we this day lay before our readers, as Members of our Society, we feel certain that the failure of the Royal Institution will never disgrace the present age[3]."

This was written several years *after* the establishment of the Institution, when its success was no longer a matter of uncertainty. By the Prospectus, it seems that the exhibition of models formed part of the original plan. "The Managers," we are told, "have purchased a very spacious and commodious house in Albemarle Street, where convenient and airy rooms will be prepared for the reception and public exhibition of all such new mechanical inventions and improvements, as shall be thought worthy of the public notice, and more especially of all such contrivances as tend to increase the conveniences and comforts of life, to promote domestic economy, to improve taste, or to advance useful industry."

On the 15th April, 1802, the following Minutes of a Meeting of the Managers were laid before the Council of the Royal Society. On a motion made by Count Rumford, seconded by Mr. Cavendish, it was :—

"Resolved, that the resolution of the Managers of the Royal Institution of the 31st March 1800, Article 4, be communicated to the Royal Society, and that the Royal Society be requested to direct their Secretaries to communicate from time to time to the Editor of the Journals of the Royal Institution, such information respecting the Papers read at the Meetings of the Society, as it may be thought proper to allow to be published in these Journals."

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[3] Pp. 22—3.

At another Meeting of the Managers held on the 31st March, 1802, it was :—

"Resolved, that this Scientific Committee be requested to superintend all the new Philosophical Experiments that shall be made at the house of the Institution, and when in the course of these experiments, any scientific discovery shall be made that shall by them be considered as being new and interesting, that they be requested to cause to be drawn up, under their direction, an account of the same, in order to its being communicated by the Managers of the Institution to the Royal Society of London.

(Signed,) "J. P. Auriol,
"*Sec. R. I.*"

The Council consented to transmit abstracts of the Papers read before the Society, for insertion in the Journal of the Institution, and "thankfully accepted the offer made by the Managers, of scientific discoveries being communicated to them."

The reader may perhaps have heard the Royal Institution designated as "the workshop of the Royal Society;" and it must be admitted, that it is fully entitled to this appellation, for it was within its laboratory that the illustrious Davy carried on those elaborate investigations, and made those brilliant discoveries, which were communicated to the scientific world through the medium of the *Transactions* of the Royal Society; and within the same walls has Dr. Faraday followed his predecessor, laying open the secrets in Nature's great laboratory, and, like him, making discoveries, which will cause his name to be held in admiration and esteem by future generations. It would be a long and laborious task to give even the titles of the memoirs connected with experimental philosophy (the result of experiments made at the Royal Institution), published in the *Transactions* of the Royal Society. The last Paper by Dr. Faraday, communicated in 1846, was the twenty-first of a series on Electricity; and the author has often said, that as long as he occupies the Chemical Professor's chair in the Royal Institution, he will consider it to be his duty to communicate all his scientific discoveries to the Royal Society.

Delightful, indeed, is it to find the same noble spirit which animated the minds of the founders of the Royal Institution, comprising the names of Banks, Rumford, and Cavendish, descending upon their successors, who manage that excellent Society. The advancement of science ought ever to be the aim of philosophers, independent of all petty jealousies.

At the request of Government, several Committees were appointed about this period, to investigate and report on matters of science; amongst these, was the appointment of one to inquire into the causes which led to an explosion of the Gas-works in Westminster, which had only just been established.

The Committee consisted of Sir Joseph Banks, Sir C. Blagden, Col. Congreve, Mr. Lawson, Mr. Rennie, Dr. Wollaston, and Dr. Young. They met several times at the Gas-works, for the purpose of examining the apparatus, and made a very elaborate Report[4].

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[4] The Report will be found in the 9th volume of the Council-minutes, p. 54.

They were strongly of opinion that if gas-lighting was to become prevalent, the gas-works ought to be placed at a considerable distance from all buildings, and that the reservoirs, or gasometers, should be small and numerous; and always separated from each other by mounds of earth, or strong party-walls. Happily, the apprehensions then entertained of the danger of gas-works no longer exist[5].

Great lustre is shed on the history of the Royal Society at the commencement of the nineteenth century, by the researches of Dr. Thomas Young, whose name stands prominently forward as a philosopher of almost universal attainments[6]. The researches more especially alluded to, are those in connexion with Physical Optics, which were communicated to the Society in 1801, 1802, and 1803, and which led to the establishment of the Undulatory Theory of Light.

The Papers containing these investigations constitute the Bakerian Lectures for the years in which they were presented to the Society, and, through the channel of the *Philosophical Transactions*, attracted the attention of foreign philosophers. "Dr. Young's Optical Theory for a long time," observes an eminent authority, "made few proselytes; and several years afterwards, Auguste Fresnel, an eminent French mathematician, took up similar views, proved their truth, and traced their consequences, by a series of labours almost independent of those of Dr. Young. It was not till the theory was thus re-echoed from another land, that it was able to take any strong hold on the attention of the countrymen of its earlier promulgator[7]."

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[5] In 1753, Sir James Lowther communicated to the Royal Society a curious notice of a spontaneous evolution of gas at a colliery belonging to him near Whitehaven. It annoyed the workmen so much that a tube was made to carry it off. Sir James states, that parties were in the habit of filling bladders with the gas, and burning it at their convenience. It appears strange that this hint did not bring gas-lighting into use earlier. Sir James Lowther's Paper is published in the 38th volume of the *Philosophical Transactions*.

[6] He was elected a Fellow of the Society at the early age of twenty-one.

In 1804, Dr. Young succeeded Mr. Layard as Foreign Secretary to the Society, which office he retained until his decease in 1829[8].

In April, 1809, some Fellows of the Society, animated by a strong desire to advance the study of Chemistry and Physiology, established an Association, the objects of which will appear by the annexed extracts from their Minutes:—

"At a Meeting of Mr. Hatchett, Mr. Home, Dr. Babington, Mr. Davy, Mr. Brodie, and Mr. William Brande, the following Resolutions were adopted:—

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[7] Whewell, *History of Inductive Sciences*, Vol. II. p. 402.

[8] Greatly as science stands indebted to Dr. Young, the obligation would in all probability have been increased, had his brilliant abilities not been wasted in professional authorship. In a letter to a friend he says: "I shall be most happy to receive from you at all times any account of your interesting investigations; but do not send me any information you are not prepared to have mentioned again, for I am always scribbling something anonymous, and I am very capable of introducing your experiments, where perhaps you would not wish them to appear—but I cannot help it. I can only give you fair warning. I have, indeed, very lately been entering into some optical subjects pretty much at large; but I do not think I shall resume the consideration of them for a long time." It was not until 1818 that Dr. Young received any appointment from Government: in that year, he was appointed Secretary to the Board of Longitude. I cannot forbear expressing a hope that the life of this eminent man may yet be given to the world, by the Dean of Ely, from whom it is expected.

"Resolved: That the branch of the science of Chemistry which comprehends the analysis and examination of animal substances, and which may properly be called Animal Chemistry, has not hitherto been sufficiently extended; and that the advances already made in it clearly demonstrate its great importance, and hold forth well-grounded hopes, that if proper pains are hereafter taken to advance it, the most important discoveries will be the result.

"That the most useful pursuit cannot be advantageously carried on, unless the united talents of persons well versed in Chemistry, in Anatomy, and in Physiology, are combined in the advancement of it.

"That as there are present at this Meeting persons skilled in all those branches of knowledge, it is in our opinion a proper measure for us to unite ourselves into a Society for the purpose of promoting the improvement of Animal Chemistry.

"That in forming ourselves into this new Society, far from intending to narrow in any degree the limits of the constitution of the Royal Society, which embrace the improvement of every species of natural knowledge, we mean to use our utmost endeavours to promote the interests of that useful body, of which many of us are already members.

"That we therefore request the President of the Royal Society to take such measures as he shall think most proper to induce the Royal Society to take us under its protection as an Assistant Society, constituted for the sole purpose of advancing, more speedily than could otherwise be done, the study of Animal Chemistry.

"That in case the Royal Society shall accede to our request, by taking our new Society under its protection as an Assistant Society, it be our first fundamental law, that all discoveries and improvements in Animal Chemistry, made by any of the Members, after they have received the approbation of this Society, be presented to the Royal Society, for the purpose of being read at their table, and printed, if they are thought worthy that distinction, in the *Philosophical Transactions.*

"That no Paper be on any pretence printed for, or on account of, this Society, unless it has been deemed by the Committee of Papers of the Royal Society not proper to be inserted in the *Philosophical Transactions,* or has been inserted therein one whole year at least before it is reprinted.

"That the Society for the improvement of Animal Chemistry do consist of two classes, the one to be called actual, the other probationary Members.

"That the qualifications of an actual Member of the Society be, his being a Fellow of the Royal Society, and that the right of electing Members, of making Bye-Laws, and of managing all the affairs of the Society, be vested solely in the actual Members.

"That the probationary Members be chosen from among such persons not being Fellows of the Royal Society, who are desirous to promote the views of this Society, without interfering in the management of its affairs; but that every Probationary Member, on being chosen a Fellow of the Royal Society, shall become an Actual Member on the day of his admission.

"Resolved: That Mr. Cavendish be requested to allow his name to be added to those of the Members of this new Society."

It appears by the Minutes of Council:—

"That the Council approved the constitution of the Society for improving Animal Chemistry, laid before them by the President, at the desire of that Society. And that the Society for improving Animal Chemistry be admitted as an Assistant Society to the Royal Society, and all officers and servants of the Royal Society are hereby required to recognize it as such in all their proceedings.

"That the President and Secretaries do, when Papers are communicated to them by the Assistant Society for the use of the Royal Society, announce them at the table, return the thanks of the Royal Society, and entitle the Papers, if ordered to be printed in the *Philosophical Transactions*, accordingly.

"That the Secretary do communicate a copy of these resolutions to the Secretary of the Assistant Society for promoting Animal Chemistry."

Being desirous of obtaining further information respecting this Society, I addressed a letter to Mr. Brande, who, with the exception of Sir B. Brodie, is the only member of it now existing. The following is Mr. Brande's reply:—

"My dear Sir, "*Royal Mint*, 4 *March*, 1847.

"The *Chemical Society* you allude to, was a Society for the promotion of Animal Chemistry; it was a kind of club, the Members of which, as far as I recollect, were Sir Joseph Banks, Mr. Cavendish, Sir Everard Home, Dr. Babington, Sir B. Brodie, Mr. Clift, Sir H. Davy, Mr. Hatchett, and myself. There were, I think, one or two others. We used to dine together at one or other's house, I think about once a month, and our principal object was the advancement of medical and physiological chemistry. You will find several papers communicated to the Royal Society, by the Society in question. We formed a kind of Committee, and agreed to present all that we thought worthy the distinction to the Royal Society. We had also a subscription fund amongst ourselves, for translating foreign works and papers, and were the first to bring Berzelius into notice in this country.

"I wish I could give you more explicit information, but I fear I have no memoranda that will help me. If I recollect right, Mr. Children was also a Member. But the great mover of the Society was Sir E. Home, and I think it was broken up when he began to grow inefficient.

"Ever, my dear Sir,
"Yours faithfully,
"*C. R. Weld, Esq.*" "W. T. Brande.

My researches lead me to accept the same conclusion with Mr. Brande, viz. that the Society was dissolved when Sir Everard Home ceased to be a member. Sir Benjamin Brodie has been so kind as to give me some additional information respecting the Association, contained in the annexed extract of a letter to me:—

"The Society of Animal Chemistry were in the habit of meeting four times annually, alternately at the houses of Sir Everard Home and Mr. Hatchett. Dr. Warren, and Mr. Children were not original members, but were admitted afterwards. Sir Joseph Banks was in the first instance a member, but he withdrew under the impression that, as President of the Royal Society, he should not belong to a section of it. Mr. Cavendish rarely attended the meetings, and indeed, (if I recollect rightly), died not very long after the club was instituted."

Sir Joseph Banks, in his Anniversary Address in November, 1809, thus alludes to the formation of the Society of Animal Chemistry:—

"Certain of our Fellows whose views lead them principally to the study of human and comparative Anatomy, and others chiefly occupied in the study of Chemistry, among whom are the names of Cavendish, Hatchett, Home, Davy, and others, having found it repeatedly necessary to consult each other, the anatomist requiring from the chemist the analysis of the different modifications of animal matters, diseased or healthy; and the chemists, on the other hand, requiring from the anatomist a circumstantial, precise, and distinct account of the nature, and origin, and situation of the matters they were requested to analyse, found it convenient to unite themselves, with the addition of some few other persons, into a Society, instituted by them for the purpose of promoting the advancement of Animal Chemistry.

"In thus uniting themselves into an Association, they however recollected that, as Fellows of the Royal Society, they owed to that body, under the tenor of the obligation they had subscribed on their admission into it, the duty of promoting to the utmost of their ability the interests of the mother Society, and they felt at the same time the propriety of continuing to consider our annual publications as the best and most convenient method of communicating to the public the transactions of the learned in all places, and, more especially, those of persons actually making a part of the body to which they belong.

"Your Council approved this design, being aware how much the association of persons of different views, united together for the cultivation of any particular branch of science, must tend to the benefit and advantage of the Royal Society; and they felt also the marked propriety of conduct in the applicants, who professed rather to strengthen the foundations of the ancient edifice, of which they made a part, than to sap and undermine it, by attempting to wrest from it the cultivation of any branch of natural knowledge placed by the original constitution under its superintending care[9]."

This extract possesses double value, as it gives us Sir Joseph Banks' opinion of the establishment of other scientific Societies, respecting which we shall have more to say presently.

Although this Society did not endure long, its existence was far from useless, as several Papers of great value were communicated by the Members to the *Philosophical Transactions.*

In 1807, the Geological Society of London was instituted. The origin and early history of this Association presents several points of interest, as it will be seen hereafter that there was a desire on the part of some Fellows of the Royal Society, who were members of the Geological Society, to amalgamate the two bodies.

Mr. Greenough kindly informs me, that the following extracts may be relied on, as giving the true origin of the Geological Society. The first is taken from Mr. Greenough's Anniversary Address to the Society in 1834:—

"With the view to enable Count Bournon to publish his elaborate monograph on carbonate of lime, Dr. Babington[10], in 1807, invited to his house a number of gentlemen, the most distinguished for their zeal in the prosecution of mineralogical knowledge. A subscription was opened, and the necessary sum readily collected. This object having been accomplished, other meetings of the same gentlemen took place for the joint purpose of friendly intercourse and mutual instruction. From such small beginnings sprang the Geological Society; and among the names of those by whose care and watchfulness it was supported during the early and most perilous crisis of its history, that of Dr. Babington must always stand conspicuous[11]."

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[9] Journal-book, Vol. XL. p. 221.

[10] Dr. Babington was a Fellow of the Royal Society, having been elected May 30, 1805: his certificate describes him as "Senior Physician to Guy's Hospital, and a gentleman eminently learned in chemistry and mineralogy." It is signed by Davy, Hatchett, Home, Wollaston, and Abernethy.

The next extract is from Dr. Whewell's Anniversary Address to the Society in 1839:—

"Sir Abraham Hume may in a peculiar manner be considered as one of the Founders of the Society. English geology, as is well known, evolved itself out of the cultivation of mineralogy,—a study which was in no small degree promoted at one time, by the fame of the mineralogical collections of Sir Abraham Hume and others. The Count de Bournon, exiled by the French revolution in 1790, brought to England new and striking views of crystallography, resembling those which Haüy was unfolding in France; and was employed to arrange and describe the mineralogical collections of Sir John St. Aubyn and Mr. Greville, and especially the collection of diamonds of Sir Abraham Hume, of which a description, illustrated with plates, was published in 1816. Some years before this period, some lovers of mineralogy met at stated times at the house of Dr. Babington, whose influence in preparing the way for the formation of this Society, was mentioned with just acknowledgment in the

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[11] *Proceedings: Geological Society*, Vol. II.

President's Address, in 1834, by Mr. Greenough; and certainly he, more fitly than any other person, could speak of the merits and services of his fellow-labourers. Of the number of these Sir Abraham Hume was one; although not, I believe, one of those who shewed their zeal for the pursuits which associated them, by holding their meetings at the hour of seven in the morning, the only time of the day that Dr. Babington's professional engagements allowed him to devote to social enjoyments of this nature.

"Out of the meetings to which I refer, this Society more immediately sprung. The connection of mineralogy with geology, is somewhat of the nature of that of the nurse with the healthy child, born to rank and fortune. The foster-mother, without being even connected by any close natural relationship with her charge, supplies it nutriment in its earliest years, and supports it in its first infantine steps; but is destined, it may be, to be afterwards left in comparative obscurity by the growth and progress of her vigorous nursling.

"The spirit which prevailed in the infancy of this Society, and to which the Society owed its permanent existence, was one which did not shrink from difficulties and sacrifices; and among the persons who were animated by this spirit, Sir Abraham Hume[12] was eminent; his purse and exertions being always at the service of the body. He gave his labours also to the Society by taking the office of Vice-President, which he discharged with diligence from 1809 to 1813[13]."

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[12] Sir Abraham was a Fellow of the Royal Society, having been elected in 1775; his certificate states that he is "a gentleman particularly conversant in natural history and mineralogy."

[13] *Proceedings: Geological Society*, Vol. III. p. 65.

The early purposes of the Society are thus stated by Mr. Lyell:—

"To multiply and record observations, and patiently to await the results at some future period, was the object proposed by the Geological Society; and it was their favourite maxim, that the time was not yet come for a general system of Geology; but that all must be content for many years to be exclusively engaged in furnishing materials for future generalizations. By acting up to these principles with consistency, they in a few years disarmed all prejudice, and rescued the science from the imputation of being a dangerous, or, at best, but a visionary, pursuit[14]."

Mr. Horner informs me, that the Society met in the first instance in a back-room at the Freemasons' Tavern, and subsequently in rooms which they rented in the Temple.

In March, 1809, a plan was proposed by the Right Hon. Charles Greville, which was supported by Sir Joseph Banks, Sir Humphry Davy, and others, to make the Geological Society an assistant association to the Royal Society. The details of the plan will be seen by the following document, copied from the original in the Archives of the Geological Society, to which I have been allowed the freest access, by the kindness of Sir Henry De la Beche, F.R.S., President of the Society:—

"*Plan for consolidating the Geological with the Royal Society, as an Assistant Society.*

"That the Geological Society do consist of two classes of subscribing Members, who shall subscribe Two Guineas annually, or subscribe for 20*l.*

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[14] *Principles of Geology*, seventh edition, p. 61.

"That the subscribing Members who are Fellows of the Royal Society, shall constitute the first class or Council of the Geological Society, and be invested with the power of electing Members, of making bye-laws, and of conducting the intercourse with the Council of the Royal Society, and all the affairs of the Society.

"That subscribing Members, not being Fellows of the Royal Society, be assistant Members, who with the other class shall form the assistant Society to the Royal Society for the advancement of Geology.

"That Members may be elected as honorary, and be admitted to the Meetings and collections without subscribing to the Fund.

"That the Anniversary be, as at present, appointed for the election of officers; on which day the President shall be elected from among the subscribing Members who are Fellows of the Royal Society, and the other officers from the subscribing Members at large.

"That the Members of the Geological Society acting as the Committee of Papers, and who are Fellows of the Royal Society, be directed regularly to communicate all Papers relative to Geology and Mineralogy with the Drawings, Specimens, and Illustrations of the same, to the Council of the Royal Society, that the Royal Society may select such Papers as it may please to read at its table and to print in the *Philosophical Transactions;* and that such Papers as shall not be selected by the Royal Society, and their Illustrations, together with any communications which the Royal Society may make to the Geological Society, shall be deposited in the collection of the Geological Society, and to be included in any publication which it may think proper to undertake at its own charge; but that on no pretence whatever shall any Paper, selected by the Royal Society for publication in its *Transactions*, be re-printed by the Geological Society in a shorter interval than is at present prescribed by the Royal Society to the Fellows of the Royal Society who are favoured with copies of their Papers printed in the *Philosophical Transactions.*

"That all existing laws of the Geological Society, which on revision shall appear inconsistent with the proposed constitution, be considered null and void: and that the first object of the Council be to consolidate the new code, and that the Council be deemed constituted, and that its functions do commence from the time the President of this Society, after communicating these proposals, shall receive the sanction of the present Members, or a majority of them.

"That the President do forthwith submit to the Members individually this proposal of a new constitution adapted to the original principles of this Society; and do request every Member to state in writing whether he inclines to be on the list as a subscribing, or as an Honorary Member: and, notwithstanding it is not necessary to consult the Honorary Members on the constitution of the Society, in forming a new list, it is proper to give an option to the Honorary Members to continue on that list, or to become subscribing members.

"That the President do notify to the President of the Royal Society whenever the proposed Council of Fellows of the Royal Society is established by the majority of the Geological Society, that its co-operation as an assistant Society may be ratified finally by the Royal Society.

"That the ratification of these resolutions by the Councils of the Royal Society and of the assistant Geological Society shall be permanently binding in honour to both Societies, and shall not be subject to repeal, as all other resolutions or bye-laws are declared to be."

The special general Meeting, for the purpose of taking the foregoing plan into consideration, took place at the Freemasons' Tavern, on the 10th March, 1809, when the following Resolutions were carried :—

"That any proposition tending to render this Society dependent upon or subservient to any other Society, does not correspond with the conception this Meeting entertains of the original principles upon which the Geological Society was founded.

"That the propositions communicated from the Right Honorable Charles Greville, having a direct tendency to render this Society dependent upon and subservient to the Royal Society, are inadmissible.

"That it has never entered into the contemplation of this Society to impose upon its Members the performance of any duties inconsistent with the obligations of those among them who may be Fellows of the Royal Society.

"That this Society, deeply and sincerely regretting that any circumstances should have occurred to implicate in the preceding Resolutions the name of the Royal Society, cheerfully embrace the opportunity thus accidentally offered to declare the high respect and deference they entertain toward that learned and scientific body, and their most earnest wish to contribute in any degree, and in proportion to their humble ability, to the welfare and prosperity of the Royal Society.

"That a copy of these Resolutions be transmitted to the President of the Royal Society."

The scientific world can have no reason to regret that the geologists preferred pursuing their course independently, for there is probably no Society of this century that has done so much to advance its particular science, as the Geological Society of London.

Reverting to the Royal Society, it is important to state that the Council continued to exercise their duties as visitors to the Observatory with great regularity, periodically examining the state of the buildings and instruments, and, when necessary, representing to Government the expediency of furnishing new instruments, or of repairing others.

The condition of the Observatory shortly after the death of the Rev. Nevil Maskelyne, (1811) will be understood from the subjoined Memorial presented to the Lords of the Treasury:—

"*The Memorial of the President and Council of the Royal Society, Visitors by virtue of His Majesty's sign-manual of the Royal Observatory of Greenwich.*

"Humbly Sheweth,

"That in the present highly improved state of the Royal Observatory, much greater exertions are required than in the time of the late Astronomer-Royal, for conducting the Observations in such a manner as to correspond to the progressive advancement of the Sciences, and to support the high character which has been allowed by all Foreigners to the English nation, for their diligence and success in the cultivation of practical as well as of theoretical Astronomy.

"The principal instrument now used in the Observatory, which was constructed under the direction of the late Astronomer-Royal, but remained unfinished at the time of his death, is certainly the most correct that has ever existed; but it requires for every Observation as much labour and time as would have been sufficient for four similar Observations made with the old instrument; hence it appears to your Memorialists that an additional assistant is indispensably required; and so much has the Astronomer-Royal felt this necessity, that, under their sanction as Visitors, he has actually employed an able person nearly three years in that capacity; by whose help he has been enabled to carry on a much more extensive system of Observations than his predecessors had ever undertaken, to the great advantage, as it appears to your Memorialists, of the Science of Astronomy.

"The late Astronomer-Royal was possessed of considerable private property, which made him regardless of any emoluments derived from his situation at the Observatory, totally inadequate as they would have been to the proper support of a person altogether dependent upon them. After his death the late Mr. Perceval very liberally consented, in behalf of his Majesty's Government, to increase the salary from 300*l.* to 600*l.* a year; but when this arrangement was made, it was not in the contemplation of the parties by whom it was discussed, that the very considerable and increased expense of coals and candles for the Observatory should be defrayed out of it. The new Instrument requires an ample supply of large wax-candles; and the continuation of the Observations at all hours of the day and night, as well as the preservation of the building and the library, make it necessary that good fires should be constantly kept up in all the apartments; and for these purposes the Board of Ordnance, on enquiry, do not find themselves authorised to make any allowance; while in other departments of their service, it is usual for such officers as are provided with houses to be supplied with coals and candles, even for their private and domestic consumption. The house of the Astronomer-Royal having hitherto been without a kitchen-garden, a suitable spot for this purpose has been liberally granted by the Ranger of the Park, and orders have been given by the Ordnance for its being properly enclosed; but some doubts having arisen with respect to the sufficiency of their authority to proceed, the inclosure remains at present suspended, to the great inconvenience of the Astronomer-Royal.

"Your Memorialists, therefore, beg leave humbly to represent the propriety, first, of the appointment of an additional assistant to the Astronomer-Royal; secondly, of the annual payment of such bills for coals and candles as shall be approved by your Memorialists, unless it be thought preferable to allow a specific quantity of each, which, according to the late consumption of the Observatory, would not be required to exceed 30 chaldrons of coals and 100 pounds of wax-candles; and thirdly, of proper authority being given to the Board of Ordnance to consider the piece of ground allotted for a garden as belonging to their department, and to proceed in inclosing it as intended."

In 1816 the Council received a letter from the Secretary of State, requesting them to afford all the assistance in their power, to ascertain by experiments the length of a pendulum, vibrating seconds of time in the latitude of London, and at different stations of the Trigonometrical Survey[15]. This application arose out of an Address presented to H.R.H. the Prince

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[15] The Rev. R. Sheepshanks, F.R.S., one of the Commissioners of Weights and Measures, has kindly revised the following pages relating to this interesting subject.

Regent, in pursuance of a resolution of the House of Commons of the 15th March, 1816:—

> "Resolved, that an humble Address be presented to H.R.H. the Prince Regent, that he will be graciously pleased to give directions for ascertaining the length of the pendulum vibrating seconds of time in the latitude of London, as compared with the standard Measure in possession of this House; and for determining the variation in length of the said pendulum at the principal stations of the Trigonometrical Survey extended through Great Britain, and also for comparing the said Standard Measure with the ten-millionth part of the Quadrant of the meridian, now used as the basis of linear measure on the Continent of Europe."

In consequence of the application from Government, the Council resolved, "That they will take every measure in their power to comply with the request of the Secretary of State for the Home Department;" and also, "That a Committee be appointed to consider of the proper means of ascertaining the length of a pendulum vibrating seconds in the latitude of London." On this Committee were placed Sir Joseph Banks, Dr. Wollaston, Mr. Combe, Mr. Giddy (afterwards Gilbert), Mr. Pond, Sir Charles Blagden, Dr. Young, Mr. Troughton, Captain Kater, Sir Henry Englefield, Mr. Henry Browne, and Colonel Mudge[16]. Before entering on the labours of the Committee, it will be desirable to give a short account of the standard measures of this country; a subject of great interest, involving the most exact science, and respecting which but little is known.

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[16] Sir John Barrow and Sir Humphry Davy were subsequently added to the Committee.

As early as the granting of Magna Charta, it was deemed expedient to have an uniformity of weights and measures throughout the realm; but although a standard measure is often referred to in official documents, it is neither defined nor identified; and "any yard measure that had been stamped at the Exchequer (in which process no great pains were taken or required), became immediately a legal standard, however much it might differ from others of a similar designation, and bearing the same mark of authenticity[17]." In 1742, the subject assumed a scientific form, as appears by the following extract from a Paper in the 42nd volume of the *Philosophical Transactions:* "Some curious gentlemen, both of the Royal Society of London, and of the Royal Academy of Sciences at Paris, thinking it might be of good use, for the better comparing together the success of experiments made in England and France, proposed some time since, that accurate standards of the measures and weights of both nations, carefully examined, and made to agree with each other, might be laid up and preserved in the Archives of the Royal Society here, and of the Royal Academy of Sciences at Paris; which proposal having been received with the general approbation of both those bodies, they were thereupon pleased to give the necessary directions for the bringing the same into effect." The Paper then proceeds to detail the manner in which the measures were examined, that of the English yard being taken from the standard at the Tower. Some objections were made to this course, because it was always considered that the original and legal standard was that kept at the Exchequer. Consequently, in April 1743, a Committee was appointed to compare the Society's standard-yard with that in the Exchequer. Their Report is published in the 42nd volume of the *Transactions.* In it they say, that "it was not at all the intention of the Society to determine what was the absolute legal length of the yard, but to lodge and preserve two measures sufficiently near to what were in common use, and well agreeing with each other for the purpose of comparing together, by some certain standard, to which recourse might be had in either kingdom, the success of such experiments made either in England or in France, in which measure or weight might particularly be concerned. But as some gentlemen have since been desirous to know how far those standards really agreed with the original ones, as they are looked upon to be, in the Chamberlain's Office of his Majesty's Exchequer, as well as with those kept for public use at Guildhall, at Founders-hall with the Watchmakers' Company, and in the Tower of London; Mr. George Graham, F.R.S., was thereupon requested, with such other assistance as he should find necessary, to take upon him the comparison of the said several standards, which he has accordingly done." The results of the examination, which took place in the presence of the President, Lord Macclesfield, and other Members of Council, are next given. The Exchequer standards were, it appears, two squared rods of brass, of the breadth and thickness of about half an inch, the one called the Yard, the other the Ell. They were deposited in the Exchequer in the reign of Queen Elizabeth, and were evidently of the rudest description. The other standard-yards were equally wanting in exactitude, and the consequence was, that no two measures were found to agree. Taking the scale of the Exchequer at 36 inches exactly (which it was not), the Society's yard was 36·0075 inches, and the other yards differed to a much greater extent[18]. These results were far from gratifying to men of science; but although the attention of Parliament was called to the expediency of making a new standard-measure, it was not until 1758, that a Committee of the House of Commons was appointed to inquire into the *original* standards of weights and measures. Their Report shows that, "in the year 1742, several Members of the Royal Society were at great pains in taking an exact measure of the standard-yards by very curious instruments, prepared by the late ingenious Mr. Graham, and that the Royal Society had a brass rod made, pursuant to their experiments." This rod was borrowed from the Society, and compared with the Exchequer standard. The Committee then examined Mr. Harris, who "observed that the rods at the Exchequer, and that of the Royal Society, were rather too small; but the Royal Society's standard was made so accurately, and by persons so skilful and exact, that he did not think it easy to obtain a more exact one; and therefore he advised that a rod should be constructed, according to a comparison to be made between the standard measures in existence." The Committee conclude their Report by stating, that they had "two rods made by Mr. Bird, according to Mr. Harris's proposal, and having those rods, together with that of the Royal Society, laid in the same place at the receipt of the Exchequer all night, with the standards of length kept there (to prevent the variation which the difference of air might make upon them), they, the next morning, compared them all; and by means of beam-compasses, brought by Mr. Bird, found them to agree as near as it was possible." The Committee recommended that one of the rods, which they marked "Standard-yard, 1758," should be carefully preserved, and considered the standard measure. It is remarkable, that although the Report of this Committee, and of another in 1759, to the same effect, were agreed to by the House, no legislative enactment upon them took place until nearly 70 years afterwards.

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[17] "Report on the New Standard Scale of the Astronomical Society," by Mr. Baily, Volume IX. of the Society's *Memoirs*.

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[18] Mr. Graham set off the Exchequer standard yard upon the Society's yard, inscribing the letters EXCH. at the end of the measure. This yard, made of brass, is still in the Society's possession, and is of great value since the destruction of the parliamentary standard.

"The legislature having thus suffered this subject to remain in the same doubtful and confused state, it was left to private individuals, whose scientific pursuits required greater accuracy and uniformity than the Government considered necessary for the more ordinary purposes of life, to follow up the subject, and to place on record some more accurate and uniform standard of their own, than those which are above alluded to. The first who appears to have turned his attention to this subject for the purposes of science, was the late Sir George Shuckburgh Evelyn, Bart., who, in a Paper inserted in the *Phil. Trans.* for 1798, has entered fully into the merits of the case. He had previously caused a brass scale of five-feet to be made by Mr. Troughton[19], which he compared with various other measures of acknowledged or reputed authority, and has recorded the results here alluded to. This scale is well known as Sir George Shuckburgh's scale: it afterwards came into the possession of the Hon. Charles Cecil Jenkinson (afterwards Earl of Liverpool), who in 1828 gave it to the Royal Society, to whom it now belongs[20]."

According to Mr. Baily, "Mr Troughton was one of the first who introduced the use of the micrometer-microscope for measuring and laying down distances on a straight line[21]." The advantages of this instrument must be obvious to every one. In the application of the beam-compass, the points of the instrument wore away the edges of the dots, which were enlarged after a few applications, and rendered very uncertain[22].

It may not be uninteresting to report the result of some of Sir George Shuckburgh's comparisons of his own scale with other scales of known celebrity and authority in his day. The Shuckburgh scale is assumed as the zero of comparison :—

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[19] Troughton had previously made a scale for himself, taking Bird's standard brass yard, which formerly belonged to Harris, as a guide.

[20] Baily's *Report on the Astronomical Society's Scale,* p. 44.

[21] Ibid., p. 45.

[22] Mr. Baily says, that the dots upon the late parliamentary standard-yard, had become so indented and worn by the rough use of the beam compasses that, "they looked under microscopes like the miniature craters of a volcano."

	Inches.	Diff. on 36 Inches.
Standard-yard Henry VII. (1490)	35·96700	− ·03300
Standard-yard Elizabeth (1588)	35·99300	− ·00700
Royal Society's Scale, marked E	36·00130	+ ·00130
,, ,, marked EXCH.	35·99330	− ·00670
Bird's Standard (1758)	36·00023	+ ·00023
General Roy's Scale, First Yard[23]	35·99990	− ·00010

We must now return to the proceedings of Government. Nothing whatever, it appears, was done by them; the same ambiguity and doubt pervaded the country, till the year 1814, when the investigation was again taken up by the House of Commons.

A Committee was appointed on the 10th May, 1814, consisting of twenty-three Members of the House of Commons, including the law-officers, and Mr. Davies Gilbert (then Mr. Giddy). They reported on the 1st July, 1814, to the effect, that the brass rod of 1758, (Bird's standard) should be called a yard[24], and that the length of a pendulum vibrating seconds of time in the latitude of London has been ascertained to be 39·13047 inches, of which the standard-yard contains 36[25]." This opinion was the result of the evidence of Professor Playfair and Dr. Wollaston; who, together with a brass-founder, were the *only* persons examined. Mr. Baily says, "this opinion was much controverted at the time, and it has since been found not to be well grounded: and indeed it appears to go beyond what Professor Playfair and Dr. Wollaston intended. For both those gentlemen must have alluded to some ulterior proceedings which it would be necessary to take, with respect to the verification of those numbers. The Committee, however, seemed to consider the case as very easy of proof, since they state, in their Report, that 'any expert watchmaker can *easily* adjust a pendulum which shall vibrate exactly sixty times in a minute,' but they have not shown how the length of that pendulum is afterwards to be measured; nor under what circumstances and conditions it is to be swung[26]."

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[23] This was used to measure the base line on Hounslow Heath.

[24] It is curious to find the Committee so easily coming to the conclusion, that this rod should be called a yard, without taking any pains whatever to ascertain whether it were so or not.

[25] *Journal of the House of Commons*, Vol. LXIX. p. 414.

In the following year it was resolved, in a Committee of the whole House, that a bill should be brought in for establishing and preserving an uniform system of weights[27] and measures, and Mr. Giddy and two other Members were requested to prepare a bill accordingly[28]. Nothing further, however, was done until 1819, when the Prince Regent, at the request of the House of Commons, appointed a Commission of Inquiry, who made three Reports on the subject. The Commissioners were, Sir Joseph Banks, Sir George Clerk, Davies Gilbert, Dr. Wollaston, Dr. T. Young, and Captain Kater. These gentlemen were all, with the exception of Sir George Clerk, Fellows of the Royal Society, and, as may be presumed, framed their Report strictly in accordance with the recommendations of the Committee appointed by the Council, several of the Members of which were also Members of the Government Commission.

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[26] Baily's *Report on New Standard Scale*, p. 51.

[27] The Commissioners adhered to the old standard of Troy, and resolved on raising the Avoirdupois weight from this basis. It was, therefore, enacted by parliament, in accordance with these recommendations, that a cubic inch of distilled water in a vacuum, weighed by brass weights, also in vacuum, at the temperature of 62° of Fahrenheit's thermometer, shall be considered equal to 252,724 grains, and that the standard troy-pound shall contain 5760 such grains; and that 7000 such grains shall be one pound avoirdupois; one sixteenth of the said pound avoirdupois shall be an ounce avoirdupois; and that one sixteenth of such ounce shall be a dram. This act was passed in 1823.

[28] *Journal of the House of Commons*, Vol. LXX. p. 294.

In their first Report (dated June 24, 1819) they state :—

> "The most authentic standards of length now in existence being found, upon a minute examination, to vary in a very slight degree from each other, although either of them might be preferred without any difference that would become sensible in common cases, we beg leave to recommend for the legal determination of the standard-yard, that which was employed by General Roy in the measurement of a base on Hounslow Heath, as a foundation for the trigonometrical operations that have been carried on by the Ordnance throughout the country, and a duplicate of which will probably be laid down on a standard scale by the Committee of the Royal Society. We propose also, upon the authority of the experiments made by this Committee, that it should be declared (for the purpose of recovering or identifying this standard, in case it should ever be lost or impaired), that the length of a pendulum vibrating seconds of mean solar time in London, on the level of the sea, and in a vacuum, is 39·1372 inches of this scale: and that the length of a metre employed in France, as the ten-millionth part of the quadrantal arc of the meridian, has been found equal to 39·3694 inches."

This opinion was founded on the pendulum experiments made by Captain Kater, at the request of the

Committee of the Royal Society. Identified as these experiments therefore are with the Society, a brief account of them becomes necessary[29].

Captain Kater caused a pendulum to be made of a bar of plate brass 1½ inches wide and ⅛ of an inch thick. To this were attached knife-edges 39·4 inches apart, made of that kind of steel which is prepared in India, and known by the name of wootz; these knife-edges were hardened, and played upon agate plates[30]. The experiments were made in the house of H. Browne, Esq., F. R. S., situated in a part of Portland Place, not liable to be much disturbed from the passing of carriages. They occupied a portion of the months of June and July, in 1817, and every precaution was taken, with regard to temperature, to prevent error. Powerful micrometer microscopes were used for the measurement of the distance between the knife-edges, which was taken when the standard scale and the pendulum were both of the same temperature, (nearly 62°).

The length of the pendulum vibrating seconds in a vacuum, at the level of the sea, measured at the temperature of 62° Fahrenheit, appeared to Captain Kater to be:—

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[29] It is of chronological importance to state, that the equality of the oscillations of a weight suspended by a line, is said to have been used by Ibn Junis, A.D., 1100, and by the Arabian Astronomers for the subdivision of portions of time. Young's *Nat. Phil.*

Mouton (*Observationes Diametrorum Solis et Lunæ;* Lugd. 1670), applied the vibrations of the simple pendulum successfully to measure the time in which the sun and moon describe their respective diameters; and in the Appendix, he proposes a decimal system of measures based on the value of a minute.

[30] This pendulum is in the possession of the Royal Society.

	Inches.
By Sir G. Shuckburgh's Standard	39·13860
General Roy's Scale	39·13717
Bird's Parliamentary Standard	39·13842

The latitude of the place of observation being 51°. 31′. 8″. 4. north[31].

But the Report of the Commissioners was not final. On the 13th July, 1820, they made a second Report, by which it appears that they altered their opinion, for they state :—

"We have examined, since our last Report, the relation of the best authenticated standards of length at present in existence, to the instruments employed for measuring the base on Hounslow Heath, and in the late trigonometrical operations. But we have very unexpectedly found that an error has been discovered in the construction of some of the instruments; we are therefore obliged to recur to the originals which they are intended to represent, and we have found reason to prefer the Parliamentary Standard by Bird in 1760, which we had not before received, both as being laid down in the most accurate manner, and as best agreeing with the most extensive comparisons which have been hitherto executed by various observers, and circulated throughout Europe, and in particular with the scale employed by the late Sir George Shuckburgh. We have therefore now to propose that this standard be considered as the foundation of all legal weights and measures, and that it be declared that the length of the pendulum vibrating seconds in a vacuum, on the level of the sea in London, is 39·13929 inches, and that of the French metre 39·37079 inches[32], the English Standards being employed at 62° of Fahrenheit."

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[31] Kater's *Experiments; in Phil. Trans.*, for 1818, p. 93.

[32] One of the objects of the Committee of the Royal Society was the comparison of the French *mètre* with the British standard measure

The discrepancy between the Reports excited great surprise amongst scientific men, nor without reason, as at last we find the Commissioners recommending the *copy of a copy* of the standard, instead of the original.

In accordance with the second Report of the Commissioners, an Act of Parliament was at length passed in June, 1824, declaring "the straight brass rod now in the custody of the Clerk of the House of Commons, whereon the words and figures, STANDARD YARD, 1760, are engraved, to be the original and genuine standard of that measure called a yard; and that the same straight line, or distance between the centres of the two points in the gold studs, in the said brass rod, (the brass being at the temperature of 62° of Fahrenheit's thermometer,) shall be the imperial standard-yard, and shall be, and is hereby declared to be, the *unit*, or only standard measure of extension." The Act subsequently declares that in case this unit be destroyed, "A new standard-yard, bearing the proportion to a pendulum vibrating seconds of mean time

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measure. Two *mètres*, through the intervention of the Institute, were accordingly procured from Paris constructed of platinum, one called *mètre à bout,* the other *mètre à traits.* The terminating planes of the first are supposed to be perfectly parallel, and the distance between them is the length of the *mètre.* The length of the *mètre à traits* is shown by two very fine lines terminated by two strongly marked pointers. Both measures were made by Fortin at Paris. The *mètre à traits* was compared with a standard *mètre* at Paris, by M. Arago, and found to be 0·00069 of an inch less than the standard. These *mètres* were compared by Captain Kater with Sir George Shuckburgh's scale. The result of the comparisons is quoted above. The *Phil. Trans.* for 1818 contains Captain Kater's paper on this subject. These Platinum *mètres* are still in the possession of the Society, and are in excellent preservation.

in the latitude of London, in a vacuum at the level of the sea, as 36 inches to 39·1393 inches, shall be constructed[33]." The scale of Sir George Shuckburgh (now the property of the Royal Society) was the measure used by Captain Kater, in ascertaining the length of a pendulum vibrating seconds[34].

It now became a question of great scientific importance, whether the pendulum vibrating seconds in the latitude of London, corresponded really with that invariable length assumed in the act of Parliament. So much doubt was felt upon this subject, that extensive series of the most delicate and difficult pendulum-experiments were made by Captain Kater, Colonel Sabine, and, at a later period, by Mr. Baily[35], who was led to take great pains, in consequence of Bessel having proved that the formula for the reduction to a vacuum was very defective[36]. Scientific men were aware that the legalised yard-standard was nearly $\frac{1}{140}$ of an inch longer than the ancient measure of the kingdom[37]. Many disadvantages were also supposed to attend a flat scale similar to those in existence, and thus it became most desirable to construct a standard measure, which should be as near perfection as possible. The difficulties to be surmounted in such an undertaking, are not only most formidable—as evinced by the repeated failures—but also extremely numerous. A Committee, however, of the Astronomical Society resolved, in 1833, to attempt the construction of a new standard scale, which, it was presumed from its form, its uniform mode of being supported, its accuracy of division, and its means of verification, would be less liable to those sources of error, which have too frequently occurred in instruments of this delicate kind[38].

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[33] This decision of the legislature was occasioned principally by the experiments made by Captain Kater, which are published in the *Phil. Trans.* for 1821.

[34] See his Paper in the *Phil. Trans.* for 1826.

[35] The original MSS. detailing the pendulum-experiments of the late Mr. Baily, filling several volumes, were presented to the Royal Society in 1846, by his sister, Miss Baily.

[36] See his Paper on the subject in the Berlin Academy *Memoirs* for 1826, wherein he gives the length of the seconds pendulum at the sea level in the latitude of Königsberg as 440·8179 lines of the toise of Peru.

[37] This was the standard of Queen Elizabeth. Mr. Baily, who saw it, says, that "it is impossible to speak too much in derision or contempt of it. A common kitchen poker filed at the ends in the rudest manner by the most bungling workman would make

Under the superintendence of Mr. Baily, a scale was constructed by Messrs. Troughton and Simms, in the form of a cylindrical tube, 1·12 inch in its exterior diameter. The tube, which is 63 inches long, and 0·19 inch thick, is not formed of one piece of metal, but consists of three brass tubes drawn one within the other. The division lines are cut on palladium pins inserted in the tube, and the whole scale, when in use, is supported on two rollers, always placed under the same points of the scale. Three thermometers are let into the tube at equal distances, for the purpose of determining its temperature.

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as good a standard. It has been broken asunder; and the two pieces have been dovetailed together, but so badly, that the joint is nearly as loose as that of a pair of tongs. Yet, till within the last ten years, to the disgrace of this country, copies of this measure have been circulated all over Europe and America, with a parchment document accompanying them (charged with a stamp which costs 3*l.* 10*s.* exclusive of official fees,) certifying that they are the true copies of the English *Standard*" *!!!*

[38] *Report of the Astronomical Society*, Vol. III. p. 181.

It will be necessary for the reader to peruse Mr. Baily's Report on this scale, published in the 9th volume of the *Memoirs of the Astronomical Society*, to become fully aware of the extraordinary pains taken to make it accurate. I have, however, the high authority of the Rev. R. Sheepshanks for saying, that this scale has not answered expectation; and that although only fourteen years ago, Mr. Baily declared it to be "the most complete copy of an original that ever was taken," it has deteriorated in such a manner, as to be unworthy of confidence.

The destruction of the Houses of Parliament by fire in 1834, proved fatal to the standard-yard, which shared the fate of the buildings, and consequently it became necessary to construct a new standard.

A Commission was appointed to consider the steps to be taken for the restoration of the standards of weights and measures, the members of which were all Fellows of the Royal Society. They consisted of Mr. Airy, Mr. Baily, Mr. Bethune, Mr. Davies Gilbert, Sir J. F. W. Herschel, Mr. Lefevre, Sir J. Lubbock, the Dean of Ely, and the Rev. R. Sheepshanks. Mr. Baily and Mr. Gilbert are deceased. Their places have been supplied by the Marquis of Northampton and Lord Wrottesley. Professor Miller, of Cambridge, has also been added to the Commission[39].

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[39] Since Mr. Baily's death, Mr. Sheepshanks has been engaged in constructing a standard-yard. The liberality of H. M. Government has placed at his command apparatus for this purpose far superior to that possessed by his predecessors: the situation in which the operation is now carrying on, (the lower tier of cellars in Somerset House,) is very favourable on account of its slow-changing temperature. Notwithstanding these advantages, the results hitherto obtained have not been as consistent as was confidently expected. By

We must now pass to the other great division of the labours of the Committee appointed by the Council, in conformity with the wishes of Government. It will be remembered, that the Address of the House of Commons contained a recommendation that the "length of a pendulum vibrating seconds at the principal stations of the trigonometrical survey, should be ascertained." Accordingly, the Committee were enjoined to take steps for effecting the desired object. They appointed Captain Kater to make the experiments, the results of which are published in the *Philosophical Transactions* for 1819. In the introductory portion of the Paper, Captain Kater says: "This work the Royal Society did me the honour to request I would undertake; and the ready compliance of Government with every requisition I made through Sir Joseph Banks[40], for that assistance without which my success might have been doubtful, led me to devote with pleasure my time and labour to this highly interesting enquiry." I must refer the reader to the Paper itself, for an account of the manner in which Captain Kater conducted the experiments, which were very numerous. The following are the results at which he arrived. Length of the pendulum vibrating seconds in parts of Sir George Shuckburgh's scale: at Unst 39·17146, at Portsoy 39·16159, at

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By further precautions, and by increasing the number of comparisons, Mr. Sheepshanks still hopes that a satisfactory solution may be obtained, and at no very distant time.

[40] Several letters were written by the Council to the Admiralty and Ordnance, respecting instruments and other matters necessary for Captain Kater. A vessel was also provided to take him to Norway from Scotland, if he thought proper to extend his observations to the latter country.

Leith Fort 39·15554, at Clifton 39·14600, at Arbury Hill 39·14250, and at Shanklin Farm 39·13614 inches[41]. Captain Kater concludes his Paper with some observations on the figure of the Earth. He describes the means of obtaining the desired result by observations at intermediate stations; and states that the length of the seconds pendulum at the Equator, deduced from the observations at Unst and Dunnose, is 39·00527 inches, and gravitation at the Equator 16·041 feet; hence he deduced that the centrifugal force at the Equator is $\frac{1}{288}$ of gravitation, or $\frac{1}{289}$ of gravity, which last being multiplied by $\frac{5}{2}$, gives ·0086505 for the sum of the fractions, expressing the ellipticity of the Earth and diminution of gravity from the Pole to the Equator[42]. But Captain Kater was far from being satisfied with this part of his investigations, for he says: "It must be evident, that nothing very decisive respecting the general ellipticity of the meridian can be deduced from the present experiments. For this purpose, it is requisite that the extreme stations should comprise an arc of sufficient length to render the effect of irregular attraction insensible; and that effect might be diminished, if not wholly prevented, by selecting stations of a similar geological character, and which should differ as little as possible in elevation above the level of the sea[43]."

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[41] *Philosophical Transactions* for 1819, p. 416.

[42] In the year 1672, a pendulum, conveyed by Richer from Paris to Cayenne, first made known the variation in the force of gravitation in different latitudes; and the progressive increase in its intensity from the Equator to the Pole. The fact, thus evidenced, furnished in the hands of Newton an experimental demonstration of the deviation of the figure of the Earth from perfect sphericity, and of its oblateness or compression at the Poles.

In 1743, Clairault demonstrated his celebrated theorem, that the sum of the two fractions, of which the one expresses the ellipticity of the Earth, and the other the ratio of the force of gravity at the Poles to that at the Equator, is always a constant quantity, and equal to $\frac{5}{2}$ of the fraction expressing the ratio of the centrifugal force at the Equator to that of gravity. From thenceforward the ellipticity of the Earth was deducible, whenever the difference between gravity at the Pole and at the Equator should be ascertained; and the pendulum became a means of investigating the precise figure of the Earth, inasmuch as it might be rendered an exact measure of the variation of the intensity, of which it had furnished the first general intimation.

It would be quite beyond the legitimate province of this work, to enter into the history of the various pendulum-experiments made by eminent philosophers with the view of determining the figure of the Earth.

The names of MM. Arago[44], Biot, Mathieu, Bouvard, and Chaix, abroad, and Colonel Sabine, Captain Foster, Messrs. Airy, Whewell, Fallows, and Baily, at home, are intimately connected with experiments of this nature. Those made by Colonel Sabine and

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[43] Captain Kater was awarded the Copley Medal for these experiments in 1817.

[44] The early life of this distinguished philosopher and republican, was well nigh brought to an untimely end by his geodætical labours. In 1806, he was sent along with M. Biot into Spain, to continue the operations necessary for the measurement of certain degrees of the meridian. At the expiration of several months, but while Arago was still in Spain, the war broke out between that country and France, and the signals of the young observer having been mistaken by the Spaniards for private communications with the enemy, he was obliged to escape in the disguise of a peasant to avoid immediate death. After undergoing imprisonment, and several romantic adventures, he regained his native country, and was immediately elected a Member of the Academy of Sciences, though only twenty-three years of age. See Biot's *Notice sur les Opérations faites en Espagne pour prolonger la Méridienne de France.*

Mr. Baily form lasting monuments of energy and zeal in the cause of science. With one or two exceptions, the *Philosophical Transactions* between the years 1818, and 1830, contain the experiments made by Englishmen, and contribute greatly to the value of this unrivalled collection of scientific memoirs. I cannot pass finally from this subject, without noticing the very handsome manner in which M. Biot speaks of the courtesy and kindness which he experienced from Sir Joseph Banks, and other Fellows of the Royal Society, when he visited this country, for the purpose of proceeding with Colonel Mudge to Scotland, to connect the measurement of certain degrees of the meridian with those already measured in Spain and France[45]. M. Biot's remarks are so interesting, that no apology is offered for their insertion. They occur in his *Notice sur les Opérations pour mesurer la Courbure de la Terre*, inserted in the *Mémoires de l'Institut* for 1818 :—

"*Lorsque, sur une des tours de Florence, Galilée, il y a deux siécles, expliquait à un petit nombre de personnes dans des entretiens presque mysterieux, ses découvertes nouvelles sur les lois de la pésanteur, le mouvemeut de la terre, et la figure des planètes, aurait-il jamais pu prévoir que ces vérités alors méconnues et persecutées, seraient, après un si court intervalle, considerées comme tellement importantes, et si généralement admirées,*

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[45] It is stated in the Council-minutes, under the date of the 16th May, 1816, that "a proposal was communicated by Sir Charles Blagden, from Count La Place and M. Biot, that the latter should come to England with the pendulum that he had used both in France and Spain, for determining the variation of its length necessary to vibrate seconds at different stations." This was referred to the Committee, who approved the plan.

que les gouvernemens de l'Europe feraient entreprendre de grandes opérations et de lointains voyages pour le seul but de les étendre, d'en constater toutes les particularités, et que par l'effet d'une propagation inespérée de toutes les connaissances, les resultats de ces travaux pourraient être offerts à l'intérêt public, dans des assemblées nombreuses composées des classes les plus éminentes de la société!"

After giving some account of the labours of Bouguer, Godin, and others, he adds :—

"*Souhaiter une chose utile aux sciences, c'était avoir d'avance l'assentiment des savants d'Angleterre et l'approbation du gouvernement de ce pays éclairé. Ni l'un ni l'autre nous manquèrent—Je partis de Paris emportant avec moi les appareils qui avaient servi sur les autres points de la méridienne. Des ordres du gouvernement anglais, obtenus par l'intervention tutélaire de Sir Joseph Banks, attendaient cet envoi à Douvres. Il me fut remis tout entier sous le sceau de la douane, sans droits, sans visite, absolument comme si je n'eusse pas changé de pays. Les mêmes soins en protégèrent le transport jusqu'à Londres, où il fut déposé chez Sir Joseph Banks. Que ne puis-je peindre ce que je sentis en voyant pour la première fois ce vénérable compagnon de Cook! Illustre par de longs voyages; rémarquable par une étendue d'esprit et par une élévation de sentiments qui le font s'interesser également aux progrès de toutes les connaissances humaines; possesseur d'un rang élevé, d'une grande fortune, d'une considération universelle, Sir Joseph a fait de tous ces avantages le patrimoine des savants de toutes les nations. Si simple, si facile dans sa bienveillance, qu'elle semble presque pour celui qui l'éprouve, l'effet d'un droit naturellement acquis; et en même temps si bon qu'il vous laisse tout le plaisir, toute l'individualité de la reconnaissance. Noble exemple d'un protectorat dont toute l'autorité est fondée sur l'estime, l'attachement, le respect, la confiance libre et volontaire; dont les titres con-*

sistent uniquement dans une bonne volonté inépuisable et dans le souvenir des services rendus ; et dont la possession longue et non contestée fait supposer de rares vertus et une exquise délicatesse quand on songe que tout ce pouvoir doit se former, se maintenir et s'exercer parmi des egaux."

This tribute to the President of the Royal Society is valuable, as illustrative of the constant care and attention which Sir Joseph Banks evinced for all matters respecting science.

Sir John Herschel's opinion on the importance of authentic standard measures, forms a fitting conclusion to this chapter:—

"It is not enough," he says, "to possess a standard of an abstract kind; a real material measure must be constructed, and exact copies of it taken. This, however, is not very difficult; the great difficulty is to preserve it unaltered from age to age; for unless we transmit to posterity the units of our measurements, such as we have ourselves used them, we, in fact, only half bequeath to them our observations. This is a point too much lost sight of, and it were much to be wished that some direct provision for so important an object were made.

"Accurate and *perfectly* authentic copies of the yard and pound, executed in platina, and hermetically sealed in glass, should be deposited deep in the interior of the massive stone work of some great public building, whence they could only be rescued with a degree of difficulty sufficient to preclude their being disturbed, unless on some very high and urgent occasion. The fact should be publicly recorded, and its memory preserved by an inscription[46]."

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[46] *Natural Philosophy*, p. 128.

CHAPTER IX.

The Society resume the consideration of the North-west Passage—Letter to the Admiralty from the Council—Lord Melville's Answer—Admiralty resolve on sending out an Expedition—The Society requested to prepare Instructions—Committee appointed—Colonel Sabine and Mr. Fisher accompany the Expedition—Scientific Results—Colonel Sabine's Experiments—Board of Commissioners for the Discovery of the Longitude—Sir Humphry Davy's Discoveries—His Memoir on Chemical Agencies—Elected Secretary—His Safety Lamp—Receives the Medals of the Society—Death of George III.—Address of the Society to George IV.—His Majesty becomes the Patron of the Society—Warrant re-appointing the Society Visitors of the Royal Observatory—Present Visitors—Letter from Mr. Airy—Establishment of the Royal Astronomical Society—Illness of Sir Joseph Banks—Resigns the Presidency—The Society refuse to accept his Resignation—Sir Joseph consents to remain in Office—The King expresses his satisfaction at this Determination—Death of Sir Joseph Banks—Letter from Lord Aberdeen—Statue of Sir J. Banks—Dr. Wollaston elected President—Memoir of him—Copley Medal awarded to Oersted—Dr. Wollaston's Address—He resigns the Office of President—Sir Humphry Davy Elected.

1820—25.

IN 1817, the Council resumed the consideration of the practicability of a North-west Passage, from reasons which will appear in the annexed letter, addressed to Lord Melville by Sir Joseph Banks, on the part of the Council:—

"My Lord, "*Royal Society*, 20 *Nov.* 1817.

"It will, without doubt, have come to your Lordship's knowledge, that a considerable change of climate, inexplicable at present to us, must have taken place in the circumpolar regions, by which the severity of the cold, that has for centuries past enclosed the seas in the high northern latitudes in an impenetrable barrier of ice, has been, during the last two years, greatly abated. Mr. Scoresby, a very intelligent young man, who commands a whaling-vessel from Whitby, observed last year that 2000 square leagues of ice, with which the Greenland seas between the latitudes of 74° and 80° N. have been hitherto covered, has in the last two years entirely disappeared[1]. The same person, who has never been before able to penetrate to the westward of the meridian of Greenwich in these latitudes, was this year able to proceed to 10° 30′ W. where he saw the coast of East Greenland, and entertained no doubt of being able to reach the land, had not his duty to his employers made it necessary for him to abandon the undertaking. This, with information of a similar nature derived from other sources; the unusual abundance of ice islands that have, during the last two summers, been brought by currents from Davis's Straits into the Atlantic; the ice which has this year surrounded the northern coast of Iceland in unusual quantity, and remained there unthawed till the middle of August, with the floods which have during the whole summer inundated all those parts of Germany, whence rivers have their sources in snowy mountains; afford ample proof that new sources of warmth have been opened, and give us leave to hope that the Arctic seas may at this time be more accessible than they have been for centuries past; and that discoveries may now be made in them, not only interesting to the advancement of science, but also to the future intercourse of mankind and the commerce of distant nations.

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[1] Mr. Scoresby addressed a letter to Sir Joseph Banks communicating this intelligence.

"The Prince Regent's Government has already given abundant proof of its disposition to follow up the plan of prosecuting discoveries for the extension of useful knowledge and the general benefit of mankind (which has so eminently distinguished the reign of his present Majesty); we cannot therefore entertain a doubt that it will be ready to avail itself of the favourable opportunity which now appears to have occurred, to endeavour to correct and amend the very defective geography of the Arctic regions, more especially on the side of America; to attempt the circumnavigation of Old Greenland, if an island or islands, as there is reason to suppose; to prove the existence or non-existence of Baffin's Bay, and to endeavour to ascertain the practicability of a passage from the Atlantic to the Pacific coast along the northern coast of North America. These are objects which may be considered as peculiarly interesting to Great Britain, not only for their proximity and the great national advantages which they involve, but also for the marked attention they called forth and the discoveries made in consequence thereof, in the very earliest periods of our foreign navigation. We have been induced to take the liberty of making this communication to your Lordship, on finding by a reference to our Minutes, that the voyage of discovery towards the North Pole, which was entrusted to the late Captain Phipps, afterwards Lord Mulgrave, was first suggested by the President and Council of the Royal Society in a communication made to Lord Sandwich, then first Lord Commissioner of the Admiralty, on the ground that such a voyage might be of service to the promotion of natural knowledge, which is the proper object of this Institution under the patronage of his Majesty. We therefore beg leave, in the event of one or more expeditions being fitted out on the present occasion, to make an offer of our services in any way that may be thought useful in the preparation thereof, or conducive to the accomplishment of the objects which such expeditions may have in view.

"I am, &c.

(Signed,) "JOSEPH BANKS."

It will be seen by this letter that the reported disappearance of large tracts of ice in the Arctic regions, was the principal cause which led the Council to urge the expediency of sending out another expedition of discovery. In a long and suggestive article in the *Quarterly Review* for October 1817, the desirableness of fitting out an Arctic Expedition is strongly urged, and many authorities are quoted to show that extraordinary changes had taken place in the great ice-fields around Greenland. The following extracts from the article are particularly interesting:—"It is generally admitted, that for the last four hundred years an extensive portion of the eastern coast of Old Greenland has been shut up by an impenetrable barrier of ice, and with it the ill-fated Norwegian or Danish Colonies, which had been established there for more than an equal length of time preceding that unfortunate catastrophe, and who were thus cut off at once from all communication with the mother-country; that various attempts have been made, from time to time, to approach the coast, with the view of ascertaining the fate of the unfortunate colonists, but in vain, the ice being everywhere impervious; and that all hope being at length abandoned, that part of this extensive tract of land which faces the east, took the appropriate name of *lost* Greenland." The reviewer then states that the whole, or at least the greater part of this vast barrier of ice, had disappeared:—

"This extraordinary fact, so interesting to science and humanity appears to rest on no slender foundation. Both its disappearance from its long-rooted position, and its re-appearance in a more southern latitude, have been witnessed by various persons worthy of credit. It had been observed in the summer-months of the year 1815, and more particularly in those of 1816 and 1817, by ships coming from the West Indies and America, as well as by those going out to Halifax and Newfoundland, that islands of ice, unusual in magnitude and number occurred in the Atlantic, many of them as far down as the fortieth parallel of latitude. Some of these were detached icebergs, from a hundred to a hundred and thirty feet above the surface of the water, and several miles in circumference; others were flat islands of packed ice, presenting so vast an extent of surface that a ship from Boston is said to have been three days entangled in it, near the tail of the Great Bank of Newfoundland. The ship of the Unitas Fratrum, proceeding to the missions on Old Greenland, was, last year eleven days beset on the coast of Labrador with icebergs, many of which had huge rocks upon them, gravel, soil, and pieces of wood.

"The packet from Halifax passed in April last, a mountain of ice two hundred feet high, and at least two miles in circumference[2]."

Many other writers allude to the changes which took place at this period in the Arctic regions, thus rendering it clear, that the Council of the Royal

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[2] Vol. XVIII. p. 102.

Society acted wisely in recommending Government to send out an expedition of discovery.

Lord Melville's reply to the letter of the Council ran thus:—

"Sir, "*Admiralty*, 10*th Decem.* 1817.

"I have had the honour to receive your letter of the 29 ult°, respecting the probability of ships being enabled now to navigate in the seas to the eastward and westward of Greenland as well as into more northern latitudes, to a greater extent and distance than has hitherto, or at least for many years, been practicable.

"The circumstances to which you have adverted, have not failed to engage the attention of the Board of Admiralty, and we have deemed it our duty, in conformity with your suggestion, to give orders for the fitting out of four vessels, of proper size and construction, to be in readiness to sail on the 1st March, with a view to the important objects stated in your letter.

"Our present intention is, that two of them should proceed into Davis's Straits, and from thence in a north-westerly, and possibly afterwards in a westerly direction, and that the other two should proceed along the coast of East Greenland to the Northward, and if practicable, afterwards to the Westward.

"I shall take the liberty of communicating with you again upon this subject, and we shall be happy to avail ourselves of the assistance of the Royal Society in preparing the detailed instructions for the guidance of the officers who may be appointed to command the above-mentioned vessels, and in directing their attention particularly to such objects as may tend to the increase of geographical knowledge, and the general advancement of science.

"I have the honor, &c.
(Signed,) "Melville.

"*The Rt. Hon. Sir Joseph Banks, Bart.*"

This letter was laid before the Council on the 8th January, 1818, and on the same day a resolution was passed: "That it be referred to the Pendulum Committee[3] to consider of and report to the Council what instruments should in their opinion be recommended to the Admiralty, for the use of the voyages of discovery now fitting out. And that they also be requested to recommend two proper persons to accompany each of the expeditions, to make the requisite observations for the improvement of science."

The Committee held several Meetings. The result of their deliberations was, that the Council recommended Captain (now Lieut.-Colonel) Sabine, R.A., to proceed with the North-west Expedition, and Mr. Fisher to accompany the Polar one. A great number of very valuable instruments, embracing all the most modern improvements, for conducting philosophical experiments and investigations, were provided by the Admiralty at the request of the Council. Nothing was left undone to render the preparations for this expedition as perfect as possible.

"The ships fitted out for the N.W. Passage were the *Isabella*, of 382 tons, commanded by Captain John Ross, and the *Alexander*, of 252 tons, under the orders of Lieut. William Edward Parry. Those destined for the Polar passage were the *Dorothea*, of 370 tons, commanded by Captain David Buchan, and the *Trent*, of 250 tons, under the command of Lieut. John Franklin[4]; to each ship there was also appointed an additional lieutenant, and two master's mates or midshipmen. Two of these lieutenants were the sons of two eminent artists, one of the late Mr. Hoppner, and the other of Sir William Beechey, and both of them excellent draughtsmen. The four ships were all fitted out as strong as wood and iron could make them, and every regard paid in the internal arrangement to the comfort and accommodation of the officers and crews. They were stored with provisions and fuel for two years; supplied with additional quantities of fresh preserved meats, tea, sugar, sago, and other articles of a similar kind. Each of the larger ships had a surgeon, and a surgeon's assistant, and the two smaller vessels an assistant-surgeon each. A master and a mate accustomed to the Greenland fishery were engaged for each ship. The whole complement of men, including officers, seamen, and marines in each of the larger ships was fifty-six, and in the smaller forty[5]."

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[3] On this occasion Sir H. Davy was added to the Pendulum Committee.

[4] This was Franklin's first Arctic Voyage: he was promoted to the rank of captain in 1822.

Sir John Barrow, and the scientific world generally, were extremely sanguine with respect to the success of these expeditions. In the work from which we have quoted, Sir John says:—

"In the whole series of expeditions for the discovery of a Northern communication between the Atlantic and Pacific Oceans, none have been fitted out on so extensive a scale, or so completely equipped in every respect, as the two which left England this present year. From the numerous attempts that have been made from the earliest periods of British Navigation to the end of the 18th century, it is sufficiently evident that the discovery of a North-west passage to India and China, has always been considered as an object peculiarly British. It engaged the attention and procured the encouragement of the first literary characters of the age, and the most respectable of the mercantile class. It has received the patronage of Sovereigns, and the promise of rewards from different parliaments. It never failed to excite a most lively interest among all conditions of men. The principal maritime nations of Europe have at different times been engaged in the same enterprize; and even Russia, as we have seen, nay, a private individual[6] of Russia, has recently fitted out a ship at his own cost, for the discovery of a communication between the two oceans by a passage round North America.

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[5] *History of Voyages in the Arctic Regions*, p. 366.

"It would therefore have been something worse than indifference if, in a reign which stands proudly pre-eminent for the spirit in which voyages of discovery have been conducted, England had quietly looked on, and suffered another nation to accomplish almost the only interesting discovery that remains to be made in geography, and one to which her old navigators were the first to open the way[7]."

It is not a little remarkable that these expeditions, which were so admirably fitted out, should have failed in adding any information of geographical importance to that already known respecting the Arctic regions. The ships sailed on the 18th April, 1818: those under the command of Captain Ross passed Cape Farewell in May, and in August they had penetrated to lat. 75° in Baffin's Bay, where a considerable quantity of ice was met with. But the Bay was not explored, and Captain Ross, conceiving that no outlet existed through Lancaster Sound, passed down the western shores, and returned to England. The *Dorothea* and *Trent* made direct for Spitzbergen, the Admiralty instructions being, that they were to pass into the Spitzbergen seas, and use their best endeavours to reach the North Pole. In spite, however, of the most arduous exertions, they were unable to attain a higher latitude than 80°. 34′. "In vain," writes Sir John Barrow, "they laboured two days in dragging the vessels with ropes and ice-anchors; for though they had left the ice behind them, the current had carried them back to the southward three miles; and it was clear that all attempts to get one mile farther to the northward would be vain[8]." The vessels were driven by a violent gale into the floating ice, which Captain Beechey describes as dashing together with fearful violence. The *Dorothea* narrowly escaped foundering. She was so much injured by the ice, that her captain was under the necessity of putting into Fair Haven, to repair the damages which she had sustained. The *Trent* was less injured. Her gallant commander, the excellent Franklin, was extremely desirous that he might be permitted to proceed alone towards the North Pole, but such a course being in opposition to the Admiralty instructions, Captain Buchan was obliged to decline entertaining Franklin's proposition[9]; and, after repairing damages, the ships put to sea on the 30th August, and arrived at Deptford on the 22nd October, 1818.

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[6] Count Romanzoff.

[7] P. 364.

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[8] *History of Voyages in the Arctic Regions*, p. 73.

[9] Shortly after Franklin's return, he drew up a proposal for another Arctic Expedition, remarkable for the originality and boldness of the plan. In it he says, "Should it be questioned whether seamen would be equal to the fatigue and labour involved in this enterprise, I can only say, I would willingly participate with any who would embark in so interesting a cause."—*MS. Document.*

In a scientific point of view these expeditions were far from fruitless. The magnetical observations made by Colonel Sabine, and communicated to the Royal Society, were considered valuable additions to physical science. The Council passed a resolution expressive of the sense they entertained of the "high merits of these communications, which afford strong proofs of the industry, ingenuity, and accuracy of Captain Sabine, and of his devotion to the cause, and ardour in the pursuit of science under circumstances, when, to ensure success, severe privations were to be endured, and great difficulties overcome."

The expedition under Ross having so signally failed in its geographical objects, it was considered desirable by the Admiralty and Council of the Royal Society, to send out another, for the purpose, as Sir John Barrow informs us, "of carrying into effect the instructions which Ross, from misapprehension, indifference, or incapacity, had failed to do[10]."

The ships appointed for the service were the *Hecla* and *Griper*, the former commanded by W. E. Parry, the latter by Matthew Liddon, both officers holding the rank of Lieutenant.

The great object of the expedition (which was placed under the command of Parry,) was in the first instance to explore Lancaster's Sound[11], and then endeavour to effect the passage to Behring's Strait. The ships were provided with very valuable instruments, and Captain Sabine, at the recommendation of the Council, was appointed astronomer to the expedition. The vessels sailed on the 11th May, 1819, and were in Lancaster's Sound at the end of July. On the 3rd August the ships penetrated through the Sound to the westward, and discovered the strait which was called Barrow, after the then Secretary to the Admiralty.

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[10] *History of Voyages in the Arctic Regions*, Vol. II. p. 77: and Sabine's Remarks on *The Account of the late Voyage of Discovery to Baffin's Bay, by Captain Ross.* 8vo. London. 1819.

[11] The official instructions are very imperative on this head.

The expedition continued its course westerly, discovering and naming various bays and headlands, and on the 4th September, crossed the meridian of 110 W. from Greenwich, in the latitude 74°. 44′. 20″, "by which," observes Lieutenant Parry in his Journal, "the ships under my orders became entitled to the sum of five thousand pounds, being the reward offered by the King's Order in Council, grounded on a late Act of Parliament, to such of his Majesty's subjects as might succeed in penetrating thus far to the westward within the Arctic circle[12]."

On the 5th September, the vessels anchored off a large island, which was named *Melville*, in compliment to the First Lord of the Admiralty; and in the course of a few days they had passed its western extremity. The ice, however, forming around them, obliged Lieutenant Parry to seek a harbour in Melville Island, in which to pass the winter. The month of August of the following year arrived before the ships could be moved from their frozen quarters, when they returned to England, and arrived on the 3rd November, 1820.

The scientific experiments made by Captain Sabine were both numerous and satisfactory. The clocks used in the pendulum experiments were the property of the Royal Society, and the same which had accompanied Captain Cook round the world[13]. The ellipticity of the Earth was found to be $\frac{1}{312{\cdot}6}$.[14]

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[12] P. 72.

In 1818, an Act of Parliament was passed repealing the previous acts, by which a Board of Commissioners for the Discovery of the Longitude at Sea, and a North-west Passage, was constituted; and a new Act was passed creating a new Board[15], with the additional appointment of three persons well versed in the sciences of mathematics, astronomy, and navigation, who were to reside "in or near the city of London," and to assist the Commissioners in scientific matters connected with the objects of the Board.

In accordance with this Act, Dr. Wollaston, Dr. Young, and Captain Kater, were appointed as a "Resident Committee of the Board of Commissioners," with a yearly salary of 100*l.* each. At the close of 1818, Dr. Young was appointed Secretary to the Board of Longitude, and charged with the supervision of the *Nautical Almanack.* "This appointment," says his biographer, "was to him a very desirable one, but the labour in which it involved him was great[16]."

Although anticipating events, we may mention here, that this Board was abolished in 1828, but the services of the Resident Committee, and of Dr. Young, were retained[17]: the latter continued to execute the duties attached to the supervision of the *Nautical Almanack*, which was published by the Admiralty.

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[13] Parry's *Journal*, Appendix, p. 164.

[14] The pendulum experiments made by Colonel Sabine, at high latitudes in 1822—3, give the ellipticity $\frac{1}{289{\cdot}1}$. I shall have occasion to notice these experiments in another place.

[15] It was enacted, that the President and three Fellows of the Royal Society were always to form part of the Board.

[16] His salary was 500*l.* per annum.

The discoveries of Sir Humphry Davy form a remarkable epoch in the history of the Society, during the early part of this century. As early as 1801, this distinguished philosopher read a Paper before the Society, upon "Galvanic Combinations," and from that period to 1829, almost every volume of the *Transactions* contains a communication by him.

In 1806, his celebrated Memoir, "On some Chemical Agencies," was read. Respecting this Paper, Dr. Whewell says, "We cannot look upon it otherwise than as a great event, perhaps the most important event of the epoch now under review. And as such it was recognized at once all over Europe. In particular, it received the distinguished honour of being crowned by the Institute of France, although that country and England were then engaged in fierce hostility. Buonaparte had proposed a prize of sixty thousand francs to any one who by his experiments and discoveries should advance the knowledge of electricity and galvanism, as much as Franklin and Volta did; and of three thousand francs for the best experiment which should be made in the course of each year on the galvanic fluid; the latter prize was, by the First Class of the Institute, awarded to Davy[18]."

In 1807, the Society became more closely connected with Davy, by his being elected Secretary. His colleagues were Wollaston and Young[19]. It will be my duty, when laying before the reader a memoir of Sir Humphry, to enter into some detail of his official life in relation to the Royal Society. I shall, therefore, at once advance to the year 1815, when he presented his first communication respecting his discovery of the Safety Lamp. This was followed by a series of Papers, remarkable for their simplicity and clearness, crowned by that read on the 11th January, 1816, when the principle of the Safety Lamp was announced, and the lamp itself constructed[20].

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[17] A new Committee, consisting of Dr. Young, Captain Sabine, and Dr. Faraday, was appointed for the performance of the duties which had before devolved upon the Board. These Gentlemen were to advise the Admiralty upon all scientific subjects.

[18] *History of the Inductive Sciences*, Vol. III. p. 180.

"These essays," says Mr. Brande, "would alone characterise their author as a philosopher of no common stamp[21]."

Sir Humphry Davy shared the fate of many other great men with respect to his invention. Various persons came forward with great eagerness to claim the merit of the discovery. Among these were Mr. George Stephenson and Dr. Clanny[22]. We shall arrive at an honest and, in all probability, a correct conclusion on this matter, after perusing the subjoined document. It is proper to state, that the controversy commenced in the north of England, and eventually engaged the attention of the Royal Society; and that, in the words of Sir H. Davy, "the signatures appended to the following resolutions are those of the first chemists and natural philosophers in the country, with the President of the Royal Society, the most illustrious body of Europe, at their head[23]."

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[19] The three Secretaries were Foreign Associates of the First Class of the French Institute.

[20] By permission of the Council of the Royal Society several copies of the account of the Safety Lamp were circulated through the coal districts.

[21] *Chemistry*, Vol. I. p. 150.

[22] Dr. Clanny constructed a Safety Lamp, which is described in the *Phil. Trans.* for 1813. The principle was forcing in air through water by bellows, but the machine was ponderous and complicated, and required a boy to work it. In 1796, M. Humboldt conceived and executed the plan of a lamp for mines upon the same principle as that of Dr. Clanny's. See *Journal des Mines*, Tome VIII.

"*Soho Square, Nov.* 20, 1817.[24]

"We have considered the evidence produced in various publications by Mr. Stephenson and his friends, in support of his claims; and having examined his lamps, and enquired into their effects in explosive mixtures, are clearly of opinion:

"First, That Mr. George Stephenson is *not* the author of the discovery of the fact, that an explosion of inflammable gas will not pass through tubes and apertures of small dimensions.

"Secondly, That Mr. George Stephenson *was not* the first to apply that principle to the construction of a safety-lamp; none of the lamps which he made in the year 1815 having been safe, and there being no evidence even of their having been made upon that principle.

Thirdly, That Sir Humphry Davy not only discovered independently of all others, and without any knowledge of the unpublished experiments of the late Mr. Tennant on Flame, the principle of the non-communication of explosions through small apertures, but that he has also the sole merit of having first applied it to the very important purpose of a safety-lamp, which has evidently been imitated in the latest lamps of Mr. George Stephenson.

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[23] Letter to J. G. Lambton, Esq.

[24] The Meeting was held in Sir Joseph Banks' house.

(Signed) "JOSEPH BANKS, P.R.S.
"WILLIAM THOMAS BRANDE.
"CHARLES HATCHETT.
"WILLIAM HYDE WOLLASTON."

A more substantial, though not a more honourable testimony of approval, was given by the coal-owners, who subscribed 2500*l.* to purchase a superb service of plate, which was embellished with a suitable inscription, and presented to Davy. It appears, that the Committee consulted him respecting the form in which he would wish the proposed present. In his answer, he says: "I hardly know how to explain myself on the particular subject of your letter; but as the Committee express themselves satisfied as to the utility of the Safety-lamp, I can only desire that their present, as it is highly honourable to me, should be likewise useful to my friends and a small social circle, which it would be as a dinner-service for ten or twelve persons. I wish that even the plate from which I eat should awaken my remembrance of their liberality, and put me in mind of an event which marks one of the happiest periods of my life." I shall have occasion to allude again to this service of plate, in connexion with the Society.

Sir Humphry Davy's scientific labours were rewarded by all the honours in the power of the Royal Society to bestow. He received the Copley, Royal, and Rumford Medals, and was several times appointed to deliver the Bakerian Lecture, which at that period consisted in reading a Paper before the Society.

In January, 1820, George III. died. The death of this Sovereign was a loss to the Royal Society, and to science generally. His long reign is remarkable for the number of eminent men who flourished in that period. Statesmen, historians, orators, and warriors, shed lustre upon an age that will always occupy a prominent position in the world's history. But to the men of science, even higher merit belongs. "In my opinion," says Lord Brougham, "these, the great teachers of the age, covered it with still greater glory than it drew from the statesmen and the warriors who ruled its affairs[25]." It is a subject of honest pride to reflect, that all the great expounders of nature's laws were Fellows of the Royal Society.

A few days after the accession of George IV., an Address was presented to the King by a deputation from the Society:—

"To the King's Most Excellent Majesty:—

"*The humble Address of the President, Council and Fellows of the Royal Society of London, for improving Natural Knowledge.*

"We, your Majesty's most dutiful and loyal subjects, the President, Council, and Fellows of the Royal Society of London for improving Natural Knowledge, humbly beg leave to approach your sacred person, to condole in the most sincere and respectful manner with your Majesty on the loss which the Nation has recently suffered in the death of your Royal Father, our late Sovereign and Patron, whose many public and private virtues must ever render his memory dear to all the inhabitants of the British Empire; and whose munificent patronage of the Sciences and liberal Arts exhibited, as well on other occasions, as in many singular instances of favour and protection granted to the Royal Society, while it has greatly tended to promote the civilization of mankind, and to extend the glory of the British name, has left on our minds an indelible sense of gratitude, and an affectionate and dutiful remembrance of our obligations both as a public body and in our individual capacities.

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[25] *Lives of Men of Science*, Preface, p. xi.

"Permit us also, Sire, to lay at your Majesty's feet our unfeigned heartfelt congratulations upon your Majesty's accession to the throne of your ancestors, to reign in your own right over a Nation which has already been raised to a rank and dignity beyond all precedent, by the wisdom of your Majesty's Councils. And allow us to express our full reliance upon the elevation of your Majesty's sentiments, as well as upon your various talents and high attainments, for the continuance of the gracious protection which our late august Sovereign was pleased to bestow on the cultivators of science in all its departments, and, on behalf of ourselves, who are already indebted to your Majesty for the honor of having your name inscribed among the Fellows of our Society, most earnestly and humbly, to entreat the still more distinguished favour of your Majesty's gracious countenance and protection in the character of our Patron, after the example of your august Predecessors, who have condescended to accept that denomination after their accession to the Throne.

"That your Majesty's reign may be long, happy, and glorious, and that you may ever rule in the hearts, as well as over the persons of a free, affectionate, and grateful people, is the earnest wish and ardent prayer of,

"Your Majesty's loyal and dutiful subjects,
"The PRESIDENT, COUNCIL, and FELLOWS
of the ROYAL SOCIETY of LONDON."

The King, according to the Journal-book, received this Address "in the most gracious manner, and was graciously pleased to become the Patron of the Society." We shall show hereafter that his patronage assumed a substantial and royal form.

His first official act respecting the Society, was to appoint certain Fellows Visitors of the Observatory, by Royal Warrant :—

"GEORGE R.

"TRUSTY and Well-beloved, We greet you well. Whereas, we have been given to understand that it would contribute very much to the improvement of Astronomy and Navigation, if we should appoint regular Visitors of our Royal Observatory at Greenwich, with sufficient powers for the due execution of that trust. We have therefore thought fit, in consideration of the learning, experience, and other necessary qualifications of our Royal Society, to constitute and appoint, as we do by these Presents constitute and appoint, you the President, and in your absence the Vice-President of our Royal Society for the time being, together with such others as the Council of the said Royal Society shall from time to time think fit to join with you, to be regular Visitors of our said Royal Observatory at Greenwich during our pleasure, authorizing and requiring you to demand of our Astronomer and Keeper of our said Observatory for the time being, to deliver to you, within six months after every year shall be elapsed, a true and fair copy of the Annual Observations he shall have made; and our further will and pleasure is, that you do likewise, from time to time, order and direct our said Astronomer and Keeper of our said Royal Observatory to make such Astronomical Observations as you in your judgment shall think proper; and that you do survey and inspect our instruments in our said Observatory, and as often as you shall find any of them defective, that you do inform our Lord High Admiral, or the Commissioners for executing the Office of Lord High Admiral, that so the said instruments may be either exchanged or repaired; and for so doing this shall be your Warrant. And so we bid you farewell. Given at our Court at Carlton House, the nineteenth day of May, 1820, in the first year of our reign.

"By his Majesty's Command,

"SIDMOUTH.

"*To our Trusty and Well-Beloved, The President of our Royal Society for the time being.*"

Accompanying the above Warrant, was a copy of the regulations issued by his Majesty for the guidance of the Astronomer-Royal, which are very similar to those heretofore issued. It is strongly insisted on, that the Astronomer-Royal is to reside in the Observatory, and never to be absent for more than ten days at a time.

The Royal Society continued to act as Visitors to the Observatory, during the reign of George IV. The visitation was held in July, and after the completion of official business, it was customary, as it is now, for the Visitors and their friends to dine together.

When William IV. became King, a new Warrant was issued. Desirous of availing myself of the most authentic information, I addressed a letter to Mr. Airy (Astronomer-Royal), requesting that he would communicate to me the nature of the new Board of Visitors. Annexed is his reply:—

"*Royal Observatory, Greenwich, July* 13, 1847.

"MY DEAR SIR,

"THE present Board of Visitors was constituted in the autumn of 1830, after the death of George IV., when, as is customary, the Warrant by which the power of visiting had been intrusted to the Council of the Royal Society, became void, and a new Warrant was in any case necessary.

"The present Board is not a Committee of any Society, but is a substantive Board. The members are, the President of the Royal Society, (Chairman), six Fellows of the Royal Society who have been named by a President, and who are then Members for life: the President of the Royal Astronomical Society, six Fellows of the Royal Astronomical Society, with similar conditions; the Plumian and Lowndean Professors at Cambridge, and the Savilian Professor at Oxford. The Ex-Presidents, who have been Members, remain Members.

"I am, &c.

"G. B. AIRY.

"*C. R. Weld, Esq.*"

It will be observed, that the Royal Society ceased from this period to be constituted sole visitors of the Observatory, and that the Royal Astronomical Society were appointed to act in concert with them. This important Society was instituted in 1820, and marks an epoch in the history of the Royal Society; as we gather from the Address, written by Sir John Herschel, and published by the Society, that the science of Astronomy was so diligently cultivated by several Fellows of the Royal Society at that period, as to have led to the accumulation of considerable collections of valuable observations, which, owing to the expense of publishing, would inevitably have been lost to the scientific world, had not the Astronomical Society been established. This Association, as we shall show presently, originated amongst Fellows of the Royal Society.

The first proposal of an association for the cultivation of Astronomy, proceeded from the late William Pearson, LL.D., F.R.S., who was born at Whitbeck, Cumberland, on the 23rd April, 1767. He early manifested a love for mechanism, and contrived and executed various machines for exhibiting and explaining astronomical phenomena; amongst which are mentioned various planetariums, and "a large Orrery with equated motions," of which there is a description by himself in Rees's *Cyclopædia*. In 1817, Dr. Pearson was presented by Lord Chancellor Eldon to the rectory of South Kilworth, where he erected an observatory, and employed a permanent assistant, whom he carefully trained in observation and computation. In 1819, he was elected a Fellow of the Royal Society. He is described in his certificate as "a gentleman well versed in various branches of natural knowledge, and more particularly in practical astronomy, and the application of science to the mechanical arts[26]."

Documents are in existence, proving that Dr. Pearson conceived the idea of an association for the promotion of astronomical science as early as 1812, and we are told that in 1816, he wrote a preparatory prospectus and address, which he submitted to Lord Erskine, with the view of obtaining his lordship's countenance and aid[27].

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[26] The certificate is signed J. Pond, E. Troughton, Charles Hatchett, Thomas Harrison, John Barrow, C. P. Burney, Wilson Lowry, and S. Groombridge.

It was not, however, until 1820, that the conception became realized. On the 12th of January in that year, a meeting of several scientific gentlemen was held at the Freemasons' Tavern, "to take into consideration the propriety and expediency of establishing a Society for the encouragement and promotion of Astronomy." A Committee consisting of Charles Babbage, F.R.S., Francis Baily, F.R.S., Captain Colby, F.R.S., H. T. Colebrooke, F.R.S., O. Gregory, J. F. W. Herschel, F.R.S., D. Moore, F.R.S., and the Rev. W. Pearson, F.R.S., was appointed to frame rules and regulations; and the first Meeting of the Members took place on the 8th February, 1820, at the house of the Geological Society in Bedford Street, Covent Garden. The late Francis Baily officiated as Secretary, and Sir John Herschel was requested to draw up an Address, which is printed in the first volume of the Society's *Transactions.*

An opinion prevails amongst some of the surviving original members, that Mr. Baily had a principal share in the formation of the Society. In the twenty-eighth Annual Report of the Council of the Royal Astronomical Society, it is stated: "however the Society may have originated, Mr. Baily was the chief agent in carrying out the idea vigorously and effectively. The Minute-books of the Council, of the ordinary Meetings, and of the general Meetings, are all in Mr. Baily's handwriting up to the vacation in 1822. But though it may appear clear that, from the first attempt at a union, Mr. Baily took that share of the actual details, which he never relinquished, it must not be forgotten that Dr. Pearson was the first to whom it suggested itself, that a Society for the promotion of Astronomy was needful and practicable, and was the first who attempted to impress that conviction upon others."

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[27] Memoir of Dr. Pearson in *Proceedings of the Royal Astronomical Society*, Vol. VIII. p. 71.

Indeed, it was not until 1819, that Mr. Baily publicly urged the erection of an Astronomical Society. In that year, he printed for private distribution a translation of Cagnoli's Memoir on a *Method of deducing the Earth's Ellipticity from Observations of very Oblique Occultations,* in which he observes: "It is much to be regretted that in this country there is no association of scientific persons formed for the encouragement and improvement of Astronomy. In almost all the arts and sciences, institutions have been formed for the purpose of promoting and diffusing a general knowledge of those particular subjects. ....But Astronomy, the most interesting and sublime of the sciences, cannot claim the fostering aid of any Society. The formation of an Astronomical Society would not only afford this advantage, but would in other respects be attended with the most beneficial consequences." It is right to state, that the Astronomical Society was not established without serious opposition, which emanated principally from Sir Joseph Banks, who imagined that the new Association would injure the Royal Society.

The Duke of Somerset had been selected as the first President of the Astronomical Society, but his Grace declined assuming office, in consequence of Sir Joseph Banks' representations. By the kindness of

Captain Smyth, who has permitted me to have access to the Archives of the Royal Astronomical Society, I am enabled to lay the Duke's letter of resignation before the reader[28]:—

"GENTLEMEN,

"THE gratification which I derived from the appointment with which your Society honoured me at its last Meeting, and which was then only qualified by the apprehension of my inadequacy as to fulfilling its duties, has since been obliged to yield entirely to a feeling of a different kind, and one which (I am sorry to say), will no longer allow me to hold that high situation. The professions which terminate the Address of your Society, and some great names which are to be found in the list of its members, had given ample ground for trusting that, as nothing was intended inimical, so nothing could follow prejudicial, to the interests of an old and chartered body. Its President is, however, of quite a different opinion, and apprehends the ruin of the Royal Society. To Sir Joseph Banks I have been long and sincerely attached, not only by the ties of public regard, but those of private friendship; and my remaining in a post which he considers as a hostile position, might be liable to unfavourable comments, and would certainly be very painful to my own feelings. I trust, therefore, you will not wonder that, under the influence of these impressions, I feel myself obliged to resign the flattering hope of connecting my name with the labours of the Astronomical Society, and that I am under the necessity of withdrawing from the list of its members; and I am induced to hope that you will receive this, my immediate and sudden resignation and recession, with that indulgence which I can only claim on account of the motive which I profess.

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[28] Council-minutes, R.A.S., Vol. I. p. 1.

I have, &c.

"*The Council, Astronomical Society.*" "SOMERSET.

A letter was also received from John Fuller, Esq., stating that "he did not mean to belong to the Astronomical Society, because it did not meet with the approbation of Sir Joseph Banks."

It is almost unnecessary to state that Sir Joseph's apprehensions were utterly groundless:—the Royal Astronomical Society has flourished, and continues to number amongst its Members several of the most eminent Fellows and most zealous supporters of the Royal Society.

In May, 1820, declining health led the venerable President to wish to retire from the chair. At a very full Meeting of the Council, specially summoned on the 18th of the above month, Sir Everard Home informed the Members, that "they were called together by desire of the President, who, in consequence of the failure of his general health, felt himself too much oppressed longer to perform the duties of President, and had, therefore, with the deepest regret, requested Sir Everard to give to the Council his resignation of that most honourable office, which has constituted the pride and happiness of his life."

This communication was received in a manner highly complimentary and flattering to Sir Joseph Banks. Instead of accepting his resignation, the Council resolved: "That they do with one voice express their most ardent wishes that the President should not withdraw from the Chair of the Society, which he has filled so ably and honourably during a period of forty-two years." It was at the same time resolved, "That the Lord Bishop of Carlisle be requested to transmit to the President the above unanimous Resolution of the Council, and to report his answer thereon."

At the next Meeting of Council, the following communication from the President was read by the Bishop of Carlisle:—

"Sir Joseph Banks begs leave to inform the Council of the Royal Society, that his motive for offering his resignation of the office of President, was a conviction that old age had so far impaired his sight and his hearing, as to render him by no means so well able to perform the duties of that respectable office as he has been. He is gratified in the extreme by finding that the Council think it possible for him to continue his services without detriment to the interests of the Society, and he begs leave to withdraw his resignation, assuring the Council that his utmost exertions shall never be wanting to conduct, so far as may be in his power, the affairs of Society."

It is recorded in the Council-minutes, that when a deputation waited upon George IV. with the Charter-book, for the purpose of obtaining his Majesty's signature as Patron of the Society, the King "congratulated the deputation upon the determination of Sir Joseph Banks to retain the office of President."

But Sir Joseph's zeal for the Society exceeded his powers. He had spoken truly, when he declared that his infirmities rendered him no longer able to preside effectually over the Society. A stronger hand than that of sickness now interposed;—that of death. His resignation which, as we have seen, he was prevailed on to withdraw, only preceded his dissolution by the brief period of four weeks. The last time that he occupied the Chair, was at the ordinary Meeting on the 16th March, 1820. On Monday the 19th June, he died.

The reader will be prepared to learn that his death was sincerely and deeply lamented by the Fellows of the Society. Time had healed nearly all those enmities which so unfortunately manifested themselves in the early period of Banks' administration, and the Meetings of the Society were attended by that harmony, alike creditable to philosophers, and advantageous to science.

At a Meeting of Council on the 7th July, 1820, it was:—

> "Resolved, That a subscription should be entered into, to construct a Monument to the memory of the late President; the highest amount of individual subscriptions being Ten Pounds. And that a circular letter be sent to the Fellows of the Royal Society, informing them of the above Resolution."

Another Meeting, with the same object, was held, the account of which I extract from the public journals of the day:—

> "At a Meeting, under the Patronage of His Majesty, for the purpose of paying a tribute of respect to the memory of the late Sir Joseph Banks, held (with the permission of the Council) at the Linnean Society, late the residence of Sir Joseph Banks, in Soho Square, on the 12th July 1821:—
>
> "Sir Humphry Davy, Bart., in the Chair:—
>
> "It was Resolved: That a subscription be entered into for a whole-length Marble Statue of the late Sir

Joseph Banks, to be executed by Mr. Chantrey, and to be placed in the hall of the British Museum.

"That an application be immediately made to the Trustees of the British Museum for permission to place the Statue when prepared.

"That the following be a Committee for carrying the above Resolution into execution :—

The Earl of Egremont.
The Earl Spencer, President of the Royal Institution.
The Earl of Aberdeen, President of the Society of Antiquaries.
The Earl Whitworth.
Sir Everard Home.
Sir Humphry Davy, Bart., President of the Royal Society.
William Hyde Wollaston, M.D.
William George Maton, M.D.
Sir James Edward Smith, President of the Linnean Society.
Thomas Andrew Knight, Esq., President of the Horticultural Society.
Joseph Sabine, Esq."

Having been informed by Colonel Sabine that the Earl of Aberdeen was in possession of the documents relating to the Statue, I wrote to his lordship, requesting to be favoured with them for the purposes of this history. Lord Aberdeen replied stating that the papers were at his house in Scotland, but that he would have much pleasure in sending them to me when he left town. After this communication, it was a considerable disappointment to receive the annexed letter from his lordship :—

"Sir, "*Haddo House, Oct.* 13, 1847.

"I have not failed to make the necessary inquiry, respecting any documents which might be preserved here of the description to which you refer. I regret to find, however, that I possess nothing but a volume prepared by Mr. Goode, and entitled *Incidental Expences on account of Sir Joseph Banks' Statue.* This contains a statement of various small disbursements made by Mr. Goode, from 1821 to 1835, amounting altogether to upwards of two hundred pounds. I cannot imagine that this account should be of the least interest to you, and, therefore, do not think it necessary to send it. I presume that it was forwarded to me, in consequence of a small balance being due to Mr. Goode. There is no notice of the proceedings of the Committee, or any reference to their Minutes; and it does not appear that any documents, except that which I have now described, has ever been sent to me. I think it possible that the more important papers connected with the proceedings of the Committee, may have been deposited in the British Museum, when the Statue was presented to the Trustees; and I have some faint recollection that such was the case; but you will do well to inquire of Sir Henry Ellis, who, I have no doubt, will readily give you all the information he may possess. I should be happy to be informed of the result of this inquiry, and have the honor to be,

"Sir,

"Your most humble and obedient Servant,

"Aberdeen."

Application to Sir Henry Ellis, and other officers of the British Museum, did not lead to the discovery of the missing documents, and it is therefore impossible to specify the exact amount that was collected.

Reference to the banker's books, and the authority of various persons, tend to the conclusion, that about 2000*l.* was subscribed: 525*l.* was paid to Sir Francis Chantrey for a statue, which was presented to the Trustees of the British Museum, in 1832, and is now in the entrance-hall of that establishment, and the surplus money was devoted to an engraving of the statue, copies of which were distributed to various institutions and individuals.

An extraordinary Meeting of the Council was called on the 29th June, 1820, for the purpose of electing a President, to remain in office until the ensuing Anniversary[29]. At this Meeting, it was "moved by Davies Gilbert, Esq., and seconded by Captain Kater, that Dr. Wollaston be appointed by the Council, President of the Royal Society, which motion, being put to the ballot, was carried. The oath of obedience, the oath of supremacy, and the President's oath, prescribed by the Charter of the Royal Society, were then administered to Dr. Wollaston[30]."

Although Dr. Wollaston held the Presidency for only a few months, yet being in all respects the head of the Royal Society during that period, a memoir of this distinguished philosopher becomes necessary to carry on the order of the work.

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[29] This course was strictly in accordance with the Charter.

[30] It appears by a letter from Sir H. Davy to Mr. Brande, that Lord Spencer was thought of as a successor to Sir Joseph Banks. Sir Humphry says:—"Lord and Lady Spencer are here (*Paris*), they give me a piece of news which I hope is incorrect, but which makes us all very uneasy; it is that Sir Joseph is going to resign the chair of the Royal Society. Pray write me a few lines to tell me if this be true. Feeling very much interested in the progress of science in Great Britain, and in the dignity of scientific men, and of the Royal Society, I shall deeply regret such a measure if it be in contemplation.........From the way in which Lord Spencer *expressed himself*, I have no doubt he would accept the chair; at the same time, I did not put the question to him; but he would give dignity to the situation, and scientific Vice-Presidents might keep alive

William Hyde Wollaston was born at East Dereham, a village sixteen miles from Norwich, on the 6th August, 1766[31]. His father, Francis Wollaston, was of some eminence as an astronomer: he published an extensive catalogue of the northern circumpolar stars, in 1800. After a preparatory education, Wollaston entered at Caius College, Cambridge, where he took the degree of M. B. in 1787, and that of M. D. in 1793. Soon afterwards he became a Tancred Fellow. During his residence at Cambridge, he seems to have devoted himself more to the pursuit of astronomy than any other science. This, probably, arose from his inheriting a predilection for the study of the heavenly bodies from his father, which was increased by his intimacy with Dr. Brinkley, then Astronomer-Royal of Ireland, and with Mr. Pond. In 1789, he left Cambridge and settled at Bury St. Edmund's, as a physician, but met with so little success in that town, that he soon removed to London. Shortly after his arrival, he became a candidate for the office of physician to St. George's Hospital; but was defeated by the election of his principal opponent, Dr. Pemberton. This circumstance had such an effect on him,

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alive the scientific character of the body.... Pray write to me by return of post upon this subject, which I think is almost a national onè."—Brande's *Chemistry*, 5th edition, p. 100.

[31] It is very remarkable, that no life of Wollaston exists, although his reputation stands so high. It has been well observed, that had he been a German or a Frenchman, the want would have long since been supplied.

as is stated, that he declared, in a moment of pique, "he would abandon the profession, and never more write a prescription, were it for his own father." But this is contradicted in a biographical notice of Dr. Wollaston, contained in the *Reports of the Astronomical Society*, where it is affirmed, that he continued to practise physic in London to the end of 1800, when an accession of fortune determined him to relinquish a profession he never liked, and devote himself wholly to science. On the 9th May, 1793, he was elected a Fellow of the Royal Society. His certificate describes him as "William Hyde Wollaston, of Huntingdon, doctor in physic, of the University of Cambridge;" and has thirteen names appended to it, among which appear those of Cavendish and Herschel. Dr. Wollaston's first contribution to the *Philosophical Transactions* was in June, 1797, the subject being a Paper "On Gouty and Urinary Concretions;" from this period, until his decease, he was a constant contributor to the *Transactions*, as well as to various scientific journals. His Papers in the *Philosophical Transactions* amount to thirty-nine. In addition to strictly chemical subjects, they include memoirs in astronomy, optics, mechanics, acoustics, mineralogy, crystallography, physiology, pathology, and botany. On the 30th November, 1804[32], he was elected Junior Secretary to the Royal Society, which office he retained until 1807. He was frequently appointed a Vice-President by Sir Joseph Banks, and, as we have seen, succeeded him in the President's Chair, until the Anniversary in 1820, when he retired in favour of Sir Humphry

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[32] It is singular that the notices of Dr. Wollaston state, that he was not elected Secretary until 1806.

Davy. It is stated that several Fellows were inclined to support him in opposition to Davy, but Wollaston having signified his determination to decline competition, gave the whole weight of his influence to Davy. Dr. Wollaston's name is intimately connected with several chemical discoveries of the highest importance. "In 1804, and 1805, he made known palladium and rhodium, two new metals, contained in the ore of platinum, and associated with osmium and iridium, discovered about the same time by Mr. Tennant. In 1809, he showed that the supposed new metal tantalum, was identical with columbium, previously discovered by Mr. Hatchett; and shortly before his death, he transmitted to the Royal Society a communication constituting the Bakerian lecture for 1828, in which he fully describes his ingenious method of rendering platinum malleable[33]." By this invention he is stated to have acquired more than thirty thousand pounds. "Dr. Wollaston," observes Dr. Thomson, "had a particular turn for contriving pieces of apparatus for scientific purposes. His reflective goniometer was a most valuable present to mineralogists, and it is by its means that crystallography has acquired the great degree of perfection which it has recently exhibited. He contrived a very simple apparatus for ascertaining the power of various bodies to refract light. His camera lucida furnished those who were ignorant of drawing, with a convenient method of delineating natural objects. His periscopic glasses must have been found useful, for they had an extensive sale; and his sliding rule for chemical equivalents, furnished a ready method for calculating the proportions of one substance necessary to decompose a given weight of another. Dr. Wollaston's knowledge was more varied, and his taste less exclusive, than any other philosopher of his time, except Mr. Cavendish; but optics and chemistry are the two sciences for which we are under the greatest obligations to him. To him we owe the first demonstration of the identity of galvanism and common electricity, and the first explanation of the cause of the different phenomena exhibited by galvanic and common electricity[34]." Dr. Wollaston was accustomed to carry on his experiments in the greatest seclusion, and with very few instruments. His laboratory was sealed to even his most intimate friends. Dr. Paris relates in his *Life of Davy*, that a foreign philosopher once called on Wollaston with letters of introduction, and expressed an anxious desire to see his laboratory. "'Certainly,' he replied; and immediately produced a small tray containing some glass tubes, a blow-pipe, two or three watch-glasses, a slip of platinum, and a few test tubes." Dr. Paris adds, that "shortly after he had inspected the grand galvanic battery constructed by Mr. Children, he met a brother chemist in the street. Seizing his button (his constant habit when speaking on any subject of interest), he led him into a secluded corner, when taking from his waistcoat pocket a tailor's thimble, which contained a galvanic arrangement, and pouring into it the contents of a small vial, he instantly heated a platinum wire to a white heat." Mr. Brande records that Dr. Wollaston's "uncommon tact, neatness, and dexterity, as an experimental chemist, will never be forgotten by those who had an opportunity of witnessing his performance of any analytical operation; he practised a peculiar method of microscopic research, in which he willingly instructed those who asked his information; and we owe to him numerous abbreviations of tedious processes, and a variety of improvements in the application of tests, which have gradually become public property, although he never could be induced to describe his manipulations in print, or to communicate to the world his happy and peculiar contrivances[35]." Apart from science, but little remains to be told. No picturesque incidents, nor romantic stories, adorn Wollaston's biography; and but few characteristic anecdotes have been preserved. His days were spent between his laboratory and his library; his evenings, at the Meetings of the Royal, the Geological, and other Societies, in whose proceedings he always took a keen interest. Occasional excursions into the country, appear to have been his only recreation. These afforded him an opportunity of prosecuting geology, which was a favourite study; and, during the last twelve years of his life, enabled him to gratify the love for angling, with which Sir H. Davy had inspired him[36]. Towards the latter part of 1828, he became dangerously ill with a disease of the brain. Feeling his end approaching, and being personally unable to write accounts of such of his discoveries and inventions, as he was reluctant should perish with him, he employed an amanuensis, and in this manner communicated some of his most valuable papers to the Royal Society. On the 26th November, 1828, he informed the Council of the Royal Society, that he had that day invested two thousand pounds in the Funds, in the name of the Society, for the purpose of applying the interest arising therefrom, to the promotion of science[37].

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[33] Brande's *Manual of Chemistry*, p. 102. The Paper is in the *Philosophical Transactions* for 1829.

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[34] *History of Chemistry*, Vol. II. p. 248.

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[35] *Manual of Chemistry*, 3rd edition, Vol. I. Introd. p. 152.

[36] Sir H. Davy thus alludes to Wollaston as an angler: "There was—alas! that I must say there was—an illustrious philosopher who was nearly of the age of fifty before he made angling a pursuit, yet he became a distinguished fly-fisher, and the amusement occupied many of his leisure hours during the last twelve years of his life. He, indeed, applied his pre-eminent acuteness, his science, and

In December, his illness increased rapidly, accompanied by severe suffering; but it is an interesting fact, that in spite of the extensive cerebral disease under which he laboured, his faculties were unclouded to the end. When he was nearly in the last agonies, one of his friends having observed, loud enough for him to hear, that he was not conscious of what was passing around him, he made a sign for pencil and paper. He then wrote down some figures, and after casting up the sum, returned the paper. The amount was right. He died on the twenty-second of Decem-

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his philosophy to aid the resources and exalt the pleasures of this amusement. I remember to have seen Dr. Wollaston a few days after he had become a fly-fisher, carrying at his button-hole a piece of caoutchouc, or Indian-rubber, when, by passing his silkworm link through a fissure in the middle, he rendered it straight and fit for immediate use. Many other anglers will remember other ingenious devices of my admirable and ever-to-be-lamented friend."—*Salmonia.*

[37] This formed the nucleus of the Donation Fund, of which a full account appears elsewhere.

ber, 1828, aged 62, only a few months before his great scientific contemporaries, Sir H. Davy[38] and Dr. Thomas Young. As the late Dr. Henry, whose opinions of Davy has been already quoted, truly observes:— "Dr. Wollaston was endowed with bodily senses of extraordinary acuteness and accuracy, and with great general vigour of understanding. Trained in the discipline of the exact sciences, he had acquired a powerful command over his attention, and had habituated himself to the most rigid correctness, both of thought and language. He was sufficiently provided with the resources of the mathematics, to be enabled to pursue with success profound inquiries in mechanical and optical philosophy, the results of which enabled him to unfold the causes of phenomena, not before understood, and to enrich the arts connected with those sciences, by the invention of ingenious and valuable instruments. In Chemistry, he was distinguished by the extreme nicety and delicacy of his observations; by the quickness and precision with which he marked resemblances and discriminated differences, the sagacity with which he devised experiments, and anticipated their results, and the skill with which he executed the analysis of fragments of new substances, often so minute as to be scarcely perceptible by ordinary eyes. He was remarkable, too, for the caution with which he advanced from facts to general conclusions; a caution which, if it sometimes prevented him from reaching at once to the most sublime truths, yet rendered every step of his ascent a secure station, from which it was easy to rise to higher and more enlarged inductions[39]."

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[38] In Davy's *Consolations of Travel*, the character of Eubathes bears a striking resemblance to that of Dr. Wollaston.

In conclusion, it may truly be said, that every part of science was familiar to Dr. Wollaston, and that, *nil erat quod non tetigit, nil tetigit, quod non ornavit.*" A fine portrait of the philosopher, by Jackson, R.A., is in the Meeting-room of the Society. The circumstances under which it came into the Society's possession, will be seen by the annexed letter from Dr. Somerville :—

"3, *Chester Terrace, Chester Square, London,*
20 *April,* 1848.

"Dear Sir,

"I have much pleasure in giving you the information you ask with regard to the Portrait of Dr. Wollaston. His family and friends knew his reluctance to have his portrait painted[40]; nevertheless, Mrs. Somerville, who earnestly wished to possess a portrait of Dr. Wollaston, many a time asked when he would sit for his picture, to which he as often answered, 'Never!' One day, however, when he was greeted with the usual question, he said, 'It is evident that I must either forego the pleasure of coming to this house, or submit; and I will submit even to that:' he added, 'Let us separately write the name of the artist to be employed.' Both named

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[39] *Elements of Chemistry*, 11th edition, p. viii.

[40] Dr. Somerville informs me that Wollaston sat to Lawrence. Wollaston called on Sir Thomas, to request him to paint a pair of eyes, which were to be well made, clear, and free from all squinting propensities, in order to illustrate his Paper "On the apparent direction of eyes in a portrait." "Then," said Lawrence, "I know the very eyes you require—sit down, for you are the possessor of them." And Wollaston, though sorely against his inclination, sat to the great painter, and his eyes are those introduced in the engraving accompanying the above-mentioned Paper.

Mr. Jackson, R.A., who was much gratified with the commission, and executed it with great success. He was so careful that he had two sittings for the hands only.

"I foresaw that there would be applications for leave to copy the picture after the death of our friend, and as it was just that the artist who had succeeded so well should reap the benefit of copying his own work, I took the picture to Mr. Jackson, and desired him immediately to begin a copy of it of the size of life; which he accordingly did.

"Mr. Warburton approved so much of what had been done, that he begged of me to tell Jackson that he would take the picture. He gave up his right to Dr. Wollaston's brother, who presented this copy to the Royal Society. The original is in Mrs. Somerville's possession, and it is duly appreciated.

"I remain, dear Sir, yours truly,

"*C. R. Weld, Esq.*" "W. Somerville.

The most remarkable incident during the brief period of Dr. Wollaston's presidency, was the adjudication of the Copley Medal to M. Oersted, of Copenhagen, for his celebrated discovery of Electro-magnetic action, which he made in 1820[41].

"It was in that year," says Dr. Whewell, "that the Philosopher announced, that the conducting wire of a voltaic circuit acts upon a magnetic needle; and thus recalled into activity that endeavour to connect magnetism with electricity, which, though apparently on many accounts so hopeful, had hitherto been attended with no success. Oersted found that the needle has a tendency to place itself at *right angles* to the wire; a kind of action altogether different from any which had been suspected. This observation was of vast importance; and the analysis of its conditions and consequences employed the best philosophers in Europe immediately on its promulgation[42]."

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[41] He was immediately elected a Foreign Member of the Society.

Dr. Wollaston followed the example of his predecessors in delivering an Address from the Chair, on the occasion of giving the Copley Medal to M. Oersted. The reader will probably be glad to have the opportunity of reading the following extract from Dr. Wollaston's Discourse. After stating that in addition to awarding the Medal to M. Oersted, the Council recommended him for election as a Foreign Member, he proceeds:—

"There are yet amongst us some who remember the keen spirit of experimental enquiry which followed the first discovery of the Leyden Phial. For though they did not witness the terrors of those who first felt the shock, the astonishment occasioned by some of the first trials in this country are in the recollection of a few of our veterans in science: they partook of the delight occasioned by the skilful management of the new, but yet unknown agent, they remember the earnestness, perhaps the warmth, with which all matters relating to it were discussed, and when a Franklin taught us to parry the violence of a thunderbolt, they felt conscious of the elevation acquired by this memorable instance of human sagacity.

"The next period of electric excitation in the philosophic world, to which I restrict myself, in conformity to the brevity which I have promised to observe, took place when the singular power first unfolded to us by Galvanism, was rendered available as an agent in chemical inquiries by the invention of the Voltaic Pile. The very astonishing effects produced by means of this instrument caused a zeal for making, repeating, and varying experiments beyond all former precedent, adding largely to the number of ingenious men active in the cause of science, and intimately leading to the most splendid results in the decomposition of the alkalies and earths, which had baffled the attempts, and even the conjectures, of all former analysts. Let us hope that the present era, which cannot fail to be celebrated in the history both of electricity and magnetism, may be as remarkable as any that have preceded for the ardent spirit with which the new game, thus unexpectedly started, is successfully pursued. It will remain on record, that in this year we first learn that the North Magnetic pole has been passed; that in this year, the superficiality of magnetic attraction appears first to have been observed; that in this year, by the very important researches of Professor Oersted, a very intimate relation is established between electricity and magnetism.

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[42] *History of the Inductive Sciences*, 2nd edition, Vol. III. p. 91.

"Let us hope that the gleam of light which thus beams upon us may be the dawn of a new day, in which the clouds, which have hitherto veiled from our sight the hidden mysteries of light and heat, of electricity and magnetism, may be dispelled, that the real nature of these imponderable agents may be revealed to us, that truths most important to the advancement of natural knowledge may burst forth in public splendor, and complete the series of wonders that we have lived to witness[43]."

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[43] Journal-book, Vol. XLII. p. 404.

When Dr. Wollaston declared that he only accepted the office of President until the Anniversary, and had no wish to become a candidate for that high office at the general Meeting, the Council looked on Sir Humphry Davy as the fittest person to preside over the Society.

Other candidates were spoken of, and a canvass was made for two; but the competition was of very short duration. On the 30th November, the attendance of Fellows at the Anniversary Meeting was unusually large. The ballot was almost unanimous in favour of Sir Humphry Davy, who was declared President elect by Dr. Wollaston.

CHAPTER X.

Memoir of Sir Humphry Davy—His great Popularity—Large Attendance at the Meetings of the Society—Davy's Discourse at the Anniversary—Scientific Labours of the Society—Communication from the French Academy—Commissioners appointed to connect the Meridians of Paris and Greenwich by Trigonometrical Operations—Numerous Committees appointed—Admiralty request the Opinion of the Society upon Coal-Tar, and Copper-Sheathing—Committees appointed—Davy's Experiments on Sheet Copper—He Discovers a Method of Protecting Copper from Corrosion—Evils of his Method—Anti-Corrosive Copper abandoned—Davy's Mortification—Society recommend Government to increase the number of Officers at the Royal Observatory.

1820—25.

SIR HUMPHRY DAVY was born at Penzance, on the 17th of December, 1778. His father, Robert Davy, had been apprenticed to a wood-carver in London, but, we are told, did not pursue the business for a living, as the death of his parent put him in possession of a patrimony amply competent for the supply of his limited desires[1].

There is no doubt, however, that he was regarded in Penzance as a wood-carver, being known by the sobriquet of "Little Carver Davy;" and Sir Humphry, when young, was always spoken of in the place as "Carver Davy's boy;" and under this title was, it is stated, first introduced to Mr. Davies Gilbert[2].

It is difficult to conceive why such pains should have been taken by some parties to conceal the calling of Davy's father, as if the honest and useful avocation of wood-carver were discreditable or debasing. It has been well said, "Some persons have such a fastidious taste, that they would have all eminent discoveries to be made by gentlemen, or men who have had a University education; but the history of philosophy will inform us, that four-fifths of the most important advancements in science have been made by self-taught men, the children of parents engaged in useful trades or occupations." Any attempt to disguise the real circumstances under which the early lives of great men have often been passed, and to represent them as more dignified than they really were, may be compared to smearing a beautiful statue of Parian marble with paint, and clothing it in a court-dress.

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[1] Paris, *Life of Davy*, p. 2.

[2] *Mag. Nat. Hist.*, Vol. III. p. 389.

Davy's father does not appear to have been remarkable for any extraordinary abilities. "He passed," says Dr. Paris, "through life without bustle, and quitted it with the usual regrets of friends and relatives."

Young Davy was first sent to a school kept by Mr. Bushell, at which reading and writing only were taught; and subsequently, at Mr. Bushell's suggestion, to the Grammar School at Penzance. From Penzance he removed to Truro, where, under the Rev. Dr. Cardew, his school education was completed.

In 1794, Mr. Davy died, and in the following year his widow, who had commenced the business of a milliner, bound Davy apprentice to Mr. Borlase, then practising as a surgeon and apothecary at Penzance.

"His mind," says Dr. Paris, "had for some time been engrossed with philosophical pursuits; but, until after he had been placed with Mr. Borlase, it does not appear that he indicated any decided turn for chemistry, the study of which he then commenced with all the ardour of his temperament; and his eldest sister, who acted as his assistant, well remembers the ravages committed on her dress by corrosive substances."

Mr. Gilbert informs us, in his *Memoir of Davy*, that "experiments instituted for the purpose of preparing colours, first directed him to the pursuit of chemistry[3]." It is worthy of attention, that he was only in his nineteenth year when he commenced the study of this science.

"His means, of course," says his brother, Dr. Davy, "were very limited; not more extensive than those with which Priestley and Scheele began their labours in the same fruitful field. His apparatus consisted chiefly of phials, wine-glasses, tea-cups, tobacco-pipes, and earthen crucibles[4], and his materials were chiefly the mineral acids and the alkalies, and some other articles which are in common use in medicine. He began his experimental trials in his bed-room, in Mr. Tonkin's house, in which he was a favourite inmate. Here there was no fire, and when he required it, he was obliged to come down to the kitchen with his crucible[5]."

One of the first original experiments in chemistry, made by Davy at Penzance, was for the purpose of ascertaining the quality of the air in the bladders of sea-weed. This experiment was intended to support a theory he had formed as to the nature of light, and to explain the mode by which the atmosphere of the ocean was maintained in a healthy condition, by marine plants growing beneath the water. A remarkable instance of the philosophical tendencies of Davy's mind.

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[3] MS. Journal-book, Vol. XLV. p. 544.

[4] Dr. Paris states, that Davy was indebted to the accident of a wreck on the coast for a case of surgical instruments. This included a clumsy clyster apparatus, which he turned into an air-pump! The sacred vessels and professional instruments of the surgery were, without the least hesitation, put into requisition for any chemical experiments.

[5] *Life*, p. 34.

Whilst under Mr. Borlase, he formed the acquaintance of Mr. Davies Gilbert (then Giddy), who appreciating his superior talents, invited him to his house at Tredrea, and offered him the use of his library. A few months after he commenced studying chemistry, he corresponded with Dr. Beddoes of Bristol, upon the subject of light and heat. The result of this and other correspondence of a chemical nature was, that when Dr. Beddoes established the "Pneumatic Institution[6]" at Bristol, and required an assistant in the laboratory, Mr. Gilbert proposed Davy for the situation, and through his kind negociation, was appointed to it. Mr. Borlase surrendered his indenture in the most generous manner, avowing that he did so "on account of the singularly promising talents which Mr. Davy had displayed."

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[6] The object of this Institution was to try the medicinal effects of various gases upon diseases. The establishment owed its rise to Dr. Beddoes, and was supported by voluntary contributions and subscriptions, which chiefly proceeded from men of science. Mr. Gilbert, in his obituary notice of Davy, delivered at the Anniversary of the Society in 1829, says, with excusable pride, "By recommending him to the patronage of Dr. Beddoes, I may have had the good fortune to fix and to smooth that splendid course which has carried him to that pinnacle of fame, which his abilities, his energies, and inventive faculties, entitled him to attain."—MS. Journal-book. Vol. XLV. p. 536.

Dr. Davy informs us, that the period of his brother's life prior to leaving Penzance, was a "very happy one." Ardently fond of nature, whose beauties he sung in poetry of no mean order[7], he was in the habit of roaming over the country; in winter, shooting, and in summer, pursuing his favourite amusement of fishing, for which he always evinced the strongest attachment.

A short time before leaving Penzance, he wrote in his note-book: "I have neither riches, nor power, nor birth, to recommend me; yet, if I live, I trust I shall not be of less service to mankind, and to my friends, than if I had been born with these advantages." On the 2nd October, 1798, he left his home to enter upon his public career. Writing to his mother from Dr. Beddoes' establishment a few days after his arrival, he says: "It will give you pleasure when I inform you, that all my expectations are answered, and that my situation is just what I could wish." Dr. Davy says: "If the situation he had accepted, of Superintendent of the Pneumatic Institution, had been created purposely for him, it could not have been more suited to the bent of his genius, or better adapted for calling into activity, and developing fully, the powers of his mind; and the collateral circumstances, generally, were not less auspicious. The society he mixed with, Dr. Beddoes' family, of which he became an inmate, and even the scenery by which he was surrounded, all contributed to exercise a favourable influence over him[8]."

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[7] A great poetic genius said—"If Davy had not been the first chemist, he would have been the first poet of his age:" he wrote poems for Southey's *Annual Anthology;* and jointly with Danvers corrected the sheets of *Thalaba.*

[8] *Life*, p. 60.

Southey, who was an intimate friend of Davy's, gives us a pleasant picture of his communion with the young philosopher at this period: "My residence at Westbury (near Bristol) was one of the happiest portions of my life.......I was then in habits of the most frequent and intimate intercourse with Davy, then in the flower and the freshness of his youth. We were within an easy walk of each other, over some of the most beautiful ground in that beautiful part of England. When I went to the Pneumatic Institution, he had to tell me of some new experiment or discovery, and of the views which it opened for him; and when he came to Westbury, there was a fresh portion of the *Madoc* for his hearing;"—and writing to William Taylor, of Norwich, Southey calls Davy a "miraculous young man, whose talents I can only wonder at."

In Davy's note-book, on first going to Bristol, the following entry occurs, which gives a distinct idea of the intellectual life he then proposed to lead. "Resolution: To work two hours with pen before breakfast on 'The Lover of Nature;' and the 'Feelings of Eldon' from six to eight; from nine till two in experiments; from four to six reading; seven till ten metaphysical reading (i. e. system of the universe)."

Davy's first scientific discovery was the detection of siliceous earth in the epidermis of the cannæ, reeds, and grasses. A child had accidentally noticed the emission of a faint light when two pieces of bonnet-cane were rubbed together; on examining the fact, Davy ascertained that on striking the pieces together, vivid sparks were produced, similar to those emitted by the collision of flint and steel. With respect to this very beautiful discovery, Davy observes in his agricultural lectures, that "the siliceous epidermis serves as a support, protects the bark from the action of insects, and seems to perform a part in the economy of these feeble vegetable tribes, similar to that performed in the animal kingdom by the shell of the crustaceous insects." In 1800, he published his *Researches, Chemical and Philosophical,* which contributed greatly to advance his fame. Of this book, Dr. Paris says: "The close philosophical reasoning, the patient and penetrating industry, the candid submission to every intimation of experiment, and the accuracy of manipulation, so remarkably displayed throughout this work, have been rarely equalled, and perhaps never surpassed[9]."

Mr. Underwood and Dr. Hope having spoken of Davy in the highest terms to Count Rumford, the latter was induced (with the concurrence of the Managers) to enter into a negociation, for the purpose of engaging the young chemist as a Lecturer at the Royal Institution. This occurred in January, 1801, and in February, as appears by the following extract from the Minute-book, he was engaged:—"Monday, 16 February, 1801. Resolved, that Mr. Humphry Davy be engaged in the service of the Royal Institution, in the capacities of Assistant Lecturer in Chemistry, Director of the Laboratory, and Assistant Editor of the Journals of the Institution; and that he be allowed to occupy a room in the house, and be furnished with coals and candles; and that he be paid a salary of one hundred guineas per annum." Davy arrived in London on the 11th March. From that period, his fame and popularity continued constantly increasing, until they attained a climax, at once extraordinary and highly dangerous. His brother tells us, that he was in the habit of receiving letters of the most laudatory nature, many written by females, who regarded him with great admiration. There is an entertaining anecdote illustrative of his popularity, even among the more humble classes. He was passing through the streets one fine night, when he observed a man showing the moon through a telescope. He stopped to look at the earth's satellite, and tendered a penny to the exhibitor. But the latter, on learning that his customer was no less a person than the great Davy, exclaimed with an important air, that "he could not think of taking money from a brother philosopher." Most persons have probably heard of the letter sent to him from Italy[10], which reached him safely, though it only bore the mysterious superscription :—

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[9] *Life*, p. 60.

SIROMFREDEVI,

LONDRA.

In a notice of this kind, it would be vain to attempt to enumerate all the scientific discoveries made by Davy, which astonished and called forth the admiration of men of science. Those relating to galvanic combinations, were communicated to the Royal Society in 1801, and from that period until 1829, he continued to furnish the *Philosophical Transactions* with Papers of the highest scientific importance[11].

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[10] Dr. Faraday tells me, that he believes the old guide up Vesuvius was the writer of this letter. Davy had desired him to communicate some intelligence respecting the Volcano.

In 1803, he was elected a Fellow of the Royal Society[12], and in 1807, one of their Secretaries. He held this appointment until 1812, when he resigned it on the occasion of his marriage. "It was," says his brother, "a situation peculiarly agreeable to him; and the attainment of it he justly valued as a great honour. The duties of it were equally suitable to his disposition, tastes, and pursuits. He delighted in friendly intercourse with men of science, was happy to afford his aid whenever required, and was always ready to answer the letters of correspondents in matters of science[13]."

In 1810, and 1811, he delivered courses of lectures in the theatre of the Royal Dublin Society, having been specially invited for this purpose by the managers of that body[14]. He received four hundred guineas for the first, and 750*l.* for the second course of lectures. The theatre on both occasions was crammed. In a letter to his mother, Davy says: "The 550 tickets, at two guineas each, were all disposed of the first week; and I am told now, that from ten to twenty guineas are offered for a ticket."

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[11] They amount to 46, and were crowned with the Copley, Rumford, and Royal Medals. For one on Electricity he received the prize of the French Institute.

[12] His certificate describes him as:—"Professor of Chemistry at the Royal Institution, a gentleman of very considerable scientific knowledge, and author of a Paper printed in the *Philosophical Transactions*." It is signed;—Morton, Kinnaird, H. C. Englefield, C. Wilkins, G. Wilson, G. Blane, E. Forster, R. J. Sullivan, C. Hatchett, Thomas Young, Webb Seymour, W. G. Maton, James Edward Smith, G. W. Jordan, John Walker, Richard Chenevix, George Knox, and A. Crichton.

[13] *Life*, p. 124.

[14] The annexed letter from the Secretary of the Dublin Society, to the President of the Royal Society, illustrates the high esteem in which Davy was held. The original is in the Archives of the Royal Society.

On the 8th April, 1812, George IV., then Prince Regent, conferred the honour of Knighthood upon Davy; and on the 11th April, Sir Humphry married Mrs. Apreece, the widow of Shuckburgh Ashby Apreece, Esq., with whom he received a considerable fortune.

"SIR, "*Royal Dublin Society, May* 4, 1810.

"I AM directed by the Dublin Society, to request that you will lay the following application before the Royal Society.

"The Dublin Society have completed their new laboratory, and propose to apply a considerable proportion of their attention to the advancement of chemical science, as so intimately connected with Agriculture and the Arts, which it is their great object to promote.

"While they witness and applaud the exertions of their own Professor, Mr. Higgins, they feel that they should be wanting both to the public, and to their own immediate object, if they did not use their best exertions to procure for Ireland the advantages of the fullest communication of the great discoveries which have been made by Mr. Professor Davy.

"That, with this view, they hope that the Royal Society, co-operating with them in the desire of diffusing useful knowledge, will be pleased to dispense so far with the engagements of Mr. Davy, as to permit him in the month of November next, (if he should himself be disposed to accede to the wishes of the Dublin Society,) to deliver in their Laboratory a course of Lectures, comprising his discoveries in Electro-chemical Science.

"I am, &c.

(Signed) "J. LESLIE FOSTER."

It is almost unnecessary to add that the Council granted the above request.

This change in his life caused him to retire from those public situations which he had long held with so much advantage to the world, and so much honour to himself. But he did not abandon his pursuit of science. In a letter to his brother, written immediately after his marriage, he says: "I give up the routine of lecturing, merely that I may have time to pursue original inquiries, and forward more the great objects of science. This has been for some time my intention, and it has been hastened by my marriage[15]."

But with married life came a change in Davy's deportment which even his warmest friends admitted and deplored. From that time he seemed to regard patrician rank and the adventitious distinctions of society with no philosophic indifference; and he is alleged to have lowered his ambition to meaner objects than were to be won on the fields of scientific investigation.

In the latter part of 1812, while experimenting upon azote and chlorine, he was severely wounded in the eye by the explosion of these substances, and rendered incapable of pursuing his investigations. It is a strong proof of his energy, that when his eye was sufficiently recovered he renewed his experiments upon the same bodies, and was again wounded in the head and hands, but slightly, as he had defended his face by a plate of glass.

In 1813, after making various tours at home with Lady Davy, he went with her to France, for the purpose of visiting the extinct volcanos in Auvergne, being accompanied by Mr. Faraday, as his secretary and chemical assistant. At this period all the French ports were rigidly closed against English travellers; but, as soon as Napoleon was made aware of Davy's object in visiting France, an unconditional order was sent to permit him to travel throughout the Emperor's dominions. His visit to Paris brought him into personal acquaintance with the principal French *savans*, from whom he received great kindness. On the 13th December, 1813, he was elected a corresponding Member of the First Class of the Imperial Institute.

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[15] *Life* by Davy, p. 136.

From Paris Sir Humphry and his party travelled to Nice, and passed into Italy, over the Col de Tende. They proceeded to Genoa, and from thence to Florence, Rome, and Naples. On his return through Milan, he made the acquaintance of the celebrated Volta. From Milan, he crossed the Alps, by the Simplon, and arrived at Geneva in June, 1814. He remained there till the middle of September, and returned to Rome for the winter. From the latter place, he again visited Naples, for the purpose of making some investigations into the geological features of Vesuvius. The results he communicated to the Royal Society. In May, 1814, he returned to England. His idea of the Continent may be gathered from the following extract of a letter to his mother:—

"We have had a very agreeable and instructive journey, but Lady Davy agrees with me in thinking that England is the only country to *live* in, however interesting it may be to *see* other countries." "I yesterday bought a good house in Grosvenor street, and we shall sit down in this happy land."

"Soon after his return from the Continent," says his brother, "he entered upon a new train of inquiry,

—the investigation of fire-damp, with a view to the protection of the mines in which it occurs, and the workmen who are exposed to its destructive agency; objects of the first importance in relation to the interests of humanity, and hardly less so as regards national wealth, and which were completely accomplished by his well-known discovery of the Safety Lamp." For this and other scientific discoveries he was created a Baronet.

In 1818, Sir Humphry proceeded to Naples, under the auspices of Government, for the purpose of examining and unrolling the ancient papyri MSS., which he conceived could be effected by chemical agency. On his way, he made several experiments on the great European rivers, in order to explain the formation of mists. At Naples, he met with every facility for his undertaking, but failed in his efforts to supersede the mechanical method employed. "It will be readily supposed," says Dr. Paris, "that a failure in an investigation from which he had anticipated so much advantage, was not sustained by a person naturally quick and irritable, without some demonstrations of impatience and dissatisfaction[16]." In 1820, Sir Humphry returned to England, and, at the Anniversary of the Royal Society in that year, was elected the President, and annually re-elected, without opposition, for seven consecutive years. Dr. Davy has given an interesting sketch of his brother's bearing on the day of election :—

"I was with him," he says, "the whole of the day, and can record with pleasure how tranquilly he passed it: in the morning he had no apprehension at failing of success, and in the afternoon he showed no undue exultation in having obtained it. Before going to the public dinner of the Society he prepared an Address, and the speeches it would be required of him to make, as was always his custom when he had to speak in public; for he held that preparation was necessary to speak well. The dinner was very fully attended; and the manner in which his speeches were received, for so grave a body, was quite enthusiastic[17]."

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[16] *Life*, p. 367. The reader, who may be interested in hearing Sir H. Davy's account of his mode of proceeding and failure, is referred to the *Philosophical Transactions* for 1821.

Sir Humphry Davy followed the example of his predecessor, in always wearing a full court-dress, when he occupied the chair. He also continued the practice of having weekly evening parties of the Fellows of the Society and literati, changing only the evening of meeting from Sunday to Saturday. These parties were given during the session of the Society, as long as he remained in his house, 28, Lower Grosvenor Street. In 1825, when he removed to 26, Park Street, Grosvenor Square, they were discontinued, and transferred to the Library of the Royal Society, where they were held after the termination of the scientific business in the Meeting-room.

Dr. Davy says, that "he was never accurately informed of the reasons which induced his brother to cease giving these evening parties." There is sufficient evidence to lead us to the conclusion, that he abandoned them on account of his diminished popularity as President of the Royal Society[18].

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[17] *Life*, p. 265.

[18] It is probable, that his ineffectual effort to prevail on Government to afford Science and the Royal Society some substantial support,

"To assert," says Dr. Paris, "that Davy retained his popularity, or to deny that he retired from the office under the frown of a considerable party, would be dishonest. As a philosopher, his claims to admiration and respect were allowed in all their latitude; but when he sought for the homage due to patrician distinction, they were denied with indignation. How strange it is, that those whom nature has placed above their fellow-men, by the god-like gift of genius, should seek from their inferiors those distinctions which are generally the rewards of fortune! An inordinate admiration of hereditary rank was the cardinal deformity of Davy's character; it was the centre from which all his defects radiated, and continually placed him in false positions[19]; for the man who rests his claims upon doubtful or ill-defined pretensions, from a sense of his insecurity, naturally becomes jealous at every apparent inattention, and he is suspicious of the sin-

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support, may have tended to chill his scientific ardour. Dr. Davy states, that "it was Sir Humphry's wish to have seen the Royal Society an efficient establishment for all the great purposes of Science, similar to the College contemplated by Lord Bacon, having subordinate to it the Royal Observatory at Greenwich, for Astronomy, and the British Museum for Natural History in its most extensive acceptation. But the Government was lukewarm or indifferent in matters of science, and gave him no effectual support; applying to him without hesitation when requiring the aids of science, and of the Fellows of the Royal Society, and when their object was attained forgetting the services."

[19] It may not be generally known, that Sir H. Davy unsuccessfully petitioned Government for the Red Ribbon of his predecessor in the chair of the Royal Society. He felt so certain his request would be granted, that his name was printed with the coveted letters K.B. appended. Captain Smyth, to whom I am indebted for this anecdote, assures me that he saw these letters attached to Davy's name in a *printed* and *published* document.

cerity of that respect which he feels may be the fruit of usurpation[20]."

It will be our business in another place to notice the scientific labours of Davy during his Presidency. It is only necessary therefore to state here, that in 1826, declining health rendered him unfit for the arduous duties connected with the high office which he held. At the Anniversary in 1826, his brother informs us, he was so ill that in delivering his Address, "it was done with such effort that drops of sweat flowed down his countenance, and those who were near him were apprehensive of his having an apoplectic seizure; and he was afterwards so much indisposed as to be unable to attend the dinner of the Society[21]."

In January, 1827, he left England for the Continent, accompanied by his brother. Change of scene and climate were not productive of any benefit, and in the following July, when at Salzburg, he sent a letter to the Royal Society, resigning his office of President. A copy of this communication will be found in another place. He travelled until October when he returned to England. One of the latest entries in his Note-book, previously to his return, was, "I think I decidedly gain ground;" but it seems he was deceived. Dr. Davy says, that "while in England he continued in the same fluctuating state, occasionally indulging in sanguine hope of recovery, and most willingly trying new modes of treatment; occasionally almost in despair of amendment, yet still struggling on, and making head manfully against his infirmities." It was at this period that he composed *Salmonia*, a delightful work, dear to all anglers of the fly-fishing school. It was a great amusement, which thus enabled him to recall old scenes of pure enjoyment. From early boyhood Davy was a disciple of the "angle," which he wielded with great zeal and success during his life[22]. His brother tells us that his patience in pursuit of his favourite sport was so great, that he "once fished with him from early dawn to twilight, in the river Aire, in June, for salmon, with little interruption, without raising a fish."

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[20] *Life*, p. 373.

[21] Ibid., p. 325.

But it is well known, that Davy considered the close communion with nature which angling affords, as one of its chief charms. Hear what he says in the work above alluded to :—

"As to the philosophical tendency of angling[23], it is a pursuit of moral discipline requiring patience, forbearance, and command of temper. As connected with natural science, it may be vaunted as demanding a knowledge of the habits of a considerable tribe of created beings—fishes, and the animals that they prey upon, and an acquaintance with the signs and tokens of the weather and its changes, the nature of the waters, and of the atmosphere. As to its poetical relations, it carries us into the most wild and beautiful scenery of nature; amongst the mountain-lakes, and the clear and lovely streams that gush from the higher ranges of elevated hills, or that make their way through the cavities of calcareous strata. How delightful in the early spring, after the dull and tedious time of winter, when the frosts disappear, and the sunshine warms the earth and waters, to wander forth by some clear stream, to see the leaf bursting from the purple bud, to scent the odours of the bank perfumed by the violet, and enamelled as it were with the primrose and the daisy; to wander upon the fresh turf below the shade of trees, whose bright blossoms are filled with the music of the bee; and on the surface of the waters to view the gaudy flies sparkling like animated gems in the sunbeams, whilst the bright and beautiful trout is watching them from below; to hear the twittering of the water-birds, who, alarmed at your approach, rapidly hide themselves beneath the flowers and leaves of the water-lily; and as the season advances, to find all these objects changed for others of the same kind, but better and brighter, till the swallow and the trout contend as it were for the gaudy May-fly, and till in pursuing your amusement in the calm and balmy evening, you are serenaded by the songs of the cheerful thrush and melodious nightingale, performing the offices of paternal love in thickets ornamented with the rose and woodbine[24]."

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[22] Mr. Brande, who was frequently Davy's companion in his angling excursions, has told me, that his mode of handling the rod, and casting the fly were clumsy, but that, nevertheless, he generally met with great success.

[23] By this is meant here fly-fishing, the only branch of the art worth pursuing.

This is a flowery sketch, and yet not over-coloured, as those who have followed the windings of some stream, now rushing over moss-clad rocks, now tranquilly gliding under arching trees, can attest.

Davy was always fond of selecting rivers and lakes for his angling excursions, as famous for their scenic beauty as for their piscatorial excellence.

It is one of my 'pleasures of memory,' to look back on an autumn, during some weeks of which, rod in hand, I followed the footsteps of the author of

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[24] *Salmonia*, p. 8.

Salmonia, amidst the magnificent scenery of Styria. I made Aussee my head-quarters; the village remains in the same primitive condition as when Davy put up at the little humble inn kept by Hackl. No fashionable tourists are to be found there, no waiters talking many languages—no guides—and no extortion. The inhabitants are supremely ignorant of any tongue save their own barbarous German; and the village boasts no curiosities, no castles, not even a church worthy turning off the road to see. Yet there are glories around, compared with which the works of man sink into absolute insignificance:—there are lakes (the Grundelsee, and Aussee) only three miles from the village, to which a bridle-road winds at the bottom of a valley, by the side of streams of wondrous beauty, which the angler will not like the less because they abound with trout,—and the lakes present scenes of great grandeur.

Amidst this scenery Davy lingered, doubtless enjoying greater happiness than when in

> "The crowd, the hum, the shock of men,"

although he moved in the world as no ordinary mortal.

The recollection of these scenes, however, brought not the desired health; and finding that this did not improve, he decided, with the consent of his physicians, on leaving England once more in pursuit of that blessing. He left London on the 29th March, 1828[25], accompanied by Dr. Tobin, and proceeded at once to Austria, and through that country to Rome, which he reached on the 20th November. He wrote of himself, during the winter, that he was "a ruin among ruins," and that he felt the truth of Waller's lines :—

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[25] His Paper "On the Phenomena of Volcanoes," was communicated to the Royal Society on the 20th of this month.

"The soul's dark cottage, batter'd and decay'd,
Lets in new light through chinks that Time has made."

In a letter to his friend Mr. Poole, written on the 6th February, 1829, he says :—

"I write and philosophise a good deal, and have nearly finished a work[26] with a higher aim than *Salmonia.* It contains the essence of my philosophical opinions, and some of my poetical reveries. I have, notwithstanding my infirmities, attended to scientific objects whensoever it was in my power, and I have sent the Royal Society a Paper on the peculiar Electricity of the Torpedo[27]. I fight against sickness and fate, believing I have still duties to perform, and that even my illness is connected in some way with my being made useful to my fellow-creatures. I have this conviction full on my mind, that intellectual beings spring from the same breath of Infinite Intelligence, and return to it again, by different courses."

But the excitement of travel, and the scenes which formerly afforded delight, ceased to interest. In the words of Wordsworth :—

"There was a time when meadow, grove, and stream,
The earth, and every common sight,
To him did seem
Apparelled in celestial light,
The glory and the freshness of a dream.

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[26] *Consolations in Travel,* which was completed when the last and fatal illness of its author commenced.

[27] This Paper was read on the 20th Nov., 1828, and is published in the *Transactions* for 1829.

It is not now as it hath been of yore;—
Turn wheresoe'er he may,
By night or day,
The things which he hath seen, he now can see no more."

On the 20th February, he was seized by a violent attack of paralysis, the intelligence of which caused Lady Davy, who was in England, to hasten to her husband in Rome. Dr. John Davy came from Malta, and did all in his power to alleviate the sufferings of his brother. There appeared some faint indications of reviving power, but even his most sanguine friends did not expect ultimate recovery.

A morbid restlessness, and the dislike of remaining in Rome during the warm season, led Sir Humphry to quit that city for Geneva. Lady Davy travelled in advance for the purpose of preparing apartments for her husband. On the 28th May, the latter arrived at Geneva, and was soon settled in comfortable rooms at the Hotel de la Couronne. The closing scene of the philosopher's life is best told in the words of his brother:—

"On our arrival at the inn he merely reclined on the sofa, and occasionally walked to the window, and looked out upon the lake, and expressed a longing wish to throw a fly, as he had been before in the habit of doing, upon its waters and his favorite Rhone. Here he learnt the death of his old friend, Dr. Thomas Young. I was not present when Lady Davy made the communication to him; but when I returned I saw him affected; and he told me how deeply he had been affected by it, even to profusion of tears, and in a manner that was almost unaccountable. In a short time he recovered his composure, and conversed on indifferent matters.

"At five o'clock he dined at table, and made a tolerable dinner. After dinner he was read to, according to his custom. At nine o'clock he prepared to go to bed. In undressing he struck his elbow against the projecting arm of the sofa on which he sat. The effect was very extraordinary: he was suddenly seized with a universal tremor; he experienced an intense pain in the part struck, and a sensation, he said, as if he were dying. He was got into bed as soon as possible. The painful sensations quickly subsided, and in a few minutes were entirely gone. There was no mark or hurt on the elbow, no pain or remaining tenderness; and the effect of the blow perplexed him no less than it did me. A slight feverish feeling followed, which he thought little of; he took an anodyne draught of the acetate of morphine, and then desired to be read to, that his mind might be composed to sleep by agreeable images.

"About half-past nine he wished to be left alone, and I took my leave of him for the night, and for ever on earth. His servant, who always slept in his room, called me about half-past two, saying he was taken very ill. I went to him immediately. He was then in a state of insensibility, his respiration extremely slow and convulsive, and the pulse imperceptible. He was dying; and in a few minutes he expired. In death his countenance was composed, and of its mildest expression, indicative of no pain or suffering in the separation of the immortal from the mortal part. This fatal moment was about three A.M., on the 29th of May[28]."

Dr. Paris states, he was informed that when Dr. Davy entered the room, Sir Humphry said, "I am dying," or words to that effect; "and when it is all over, I desire that no disturbance of any kind may be made in the house; lock the door, and let every one retire quietly to his apartment[29]." The mortal remains of the great philosopher were honoured by a public funeral. They were deposited in the cemetery without the walls, close to the grave of Professor Pictet. Davy had such a dread of a *post-mortem* examination, that he exacted a promise from his brother that his corpse should not be opened. "Consequently," says the latter, "his disease, as to its exact kind and the immediate cause of his death, must ever remain doubtful."

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[28] *Life*, p. 423.

The pens of various distinguished individuals were employed to perpetuate the memory of Davy, and do honour to his genius. Mr. Davies Gilbert, his successor in the chair of the Royal Society, paid a high tribute to him[30]:—"The poetic bent of his mind," he observes, "seems never to have left him. To that circumstance I would ascribe the distinguishing features in his character and in his discoveries. A vivid imagination, sketching out new tracts in regions unexplored, for the judgment to select those leading to the recesses of abstract truth[31]."

The late Dr. Henry has given us a masterly delineation of Davy's intellectual character:—

> "To those high gifts of nature, which are the characteristics of genius, and which constitute its very essence, Davy and Wollaston united an unwearied industry and zeal in research, and habits of accurate reasoning, without which even the energies of genius are

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[29] *Life*, p. 515.

[30] It is not a little remarkable, that the three great men, Davy, Wollaston, and Young, joint Secretaries of the Royal Society, should have died within a few months of each other.

[31] MS. Journal-book, Vol. XLV. p. 545.

inadequate to the achievement of great scientific designs. With these excellencies, common to both, they were nevertheless distinguishable by marked intellectual peculiarities. Bold, ardent, enthusiastic, Davy, soared to greater heights; he commanded a wider horizon, and his keen vision penetrated to its utmost boundaries. His imagination, in the highest degree fertile and inventive, took a rapid and extensive range in pursuit of conjectural analogies, which he submitted to close and patient comparison with known facts, and tried by an appeal to ingenious and conclusive experiments. He was imbued with the spirit, and was master in the practice, of the inductive logic; and he has left us some of the noblest examples of the efficacy of that great instrument of human reason in the discovery of truth. He applied it, not only to connect classes of facts of more limited extent and importance, but to develope great and comprehensive laws, which embrace phenomena that are almost universal to the natural world. In explaining those laws he cast upon them the illumination of his own clear and vivid conceptions; he felt an intense admiration of the beauty, order, and harmony, which are conspicuous in the perfect CHEMISTRY of NATURE; and he expressed those feelings with a force of eloquence, which could issue only from a mind of the highest powers and of the finest sensibilities[32]."

It devolved upon Baron Cuvier to pronounce Davy's *éloge* before the Institute of France; but I can only spare space for the peroration:—

"*Ainsi a fini à cinquante ans, sur une terre étrangère, un génie dont le nom brillera avec éclat parmi cette foule si éclatante de noms dont s'enorgueillit la Grande Bretagne. Mais, que*

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[32] *Elements of Chemistry*, 11th edition, p. viii.

dis-je? pour un tel homme aucune terre n'est étrangère; Genève surtout ne pouvait pas l'être, où, depuis vingt ans, il comptait des amis intimes, des admirateurs sans cesse occupés de répandre ses découvertes sur le Continent: aussi le deuil n'eût pas été plus grand ni les obsèques plus honorables pour un de leur concitoyens les plus respectés. Les magistrats, l'université entière éleves et professeurs, tout ce que la ville renfermait d'habitants et d'étrangers, se sont fait un devoir d'y assister; chacun enfin s'empressa de prouver que les sciences sont cosmopolites; et, pour lui donner la plus haute marque d'estime, l'Académie de Genève a accepté une fondation faite en son honneur par Madame Davy, en vertu de la quelleil sera décerné tous les deux ans un prix à l'expérience chimique la plus neuve et la plus féconde; en sorte que son nom demeurera encore attaché aux vérités qui se découvriront long-temps après lui dans la science où il en a découvert de si importantes[33]."

Sir H. Davy, in his will (made two years before his death), has given evidence of his good feeling towards the Royal Society. In a clause he leaves all his plate to Lady Davy, to revert to his brother in case of his surviving her, and if not, to any child of his who may be capable of using it; but if he be not in a situation to use or enjoy it, then, he adds:—"I wish it to be melted and given to the Royal Society, to found a medal, to be given annually, for the most important discovery in Chemistry, anywhere made in Europe or Anglo-America."

The Society are indebted to Lady Davy for the fine portrait of her husband, by Lawrence[34], which was accompanied by the following letter to Mr. Gilbert:—

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[33] *Mémoires de l'Institut*, 1833, p. 37.

[34] This portrait has been frequently engraved.

"MY DEAR SIR, "26, *Park Street, Nov.* 23, 1829.

"I HAVE to request that you will have the goodness to communicate this letter to the Royal Society. Being so fortunate as to possess an invaluable little picture of Sir Humphry Davy, I feel enabled to resign the only portrait painted of him by his celebrated friend the President of the Royal Academy, and to present it to the Royal Society. I have greater pleasure in doing this, because Sir Humphry, having recommended to my care under his own hand, and in the words which follow, 'all arrangements which may make my remembrance useful to the world, and awaken the kind feelings of my friends,' I think I cannot more conscientiously obey, than in giving this speaking resemblance of their late President to a body, for whom he so ardently laboured, and to whom he was so strongly attached. I must be pardoned for feeling a deep and double interest in this gift which I make to the Royal Society, first, as relating to the great Philosopher himself, and then relative to the eminent artist whose pencil has been so eminently successful in this work. I am glad to make this communication through you, as one of Sir Humphry's early and steady friends, and his successor in the honourable chair of the Royal Society[35]."

"I am, &c.

"JANE DAVY[36].

"*Davies Gilbert, Esq., P.R.S.*"

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[35] Archives: Royal Society.

[36] A curious history attaches to this picture, for the particulars of which I am indebted to Lady Davy, and W. H. Pepys, Esq., F.R.S. It appears, that shortly after it had been placed in Mr. Gilbert's hands by Lady Davy, for presentation to the Society, Sir Thomas Lawrence expressed a desire to have the Portrait for the purpose, as was understood, of retouching it; which request was granted

No one assumed the chair of the Royal Society with a higher conception of the importance of the office of President, than Sir Humphry Davy.

Philosophers are happily yet amongst us, who well remember the crowded meetings which honoured, as they welcomed the discoverer of the Safety Lamp to the chair of the Royal Society. There is, at all times, a pleasure in witnessing the advancement of genius. In the rapid elevation of Davy was afforded another and a brilliant example of the truth of the lines :—

> "Fulgente trahit constrictos gloria curru
> Non minus ignotos generosis :"

and the glory, in this case, was of the most exalted nature. It was indeed a great rise,—a few years before apprenticed to an apothecary, his means so

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granted by Mr. Gilbert. Several months having elapsed, and the picture not being returned, nor heard of, inquiries were made, and it was discovered that Sir Thomas Lawrence had given it to Hurst and Robinson, the publishers, who had paid 100*l.* for the copyright, with the view of having it engraved. Lady Davy, who was naturally extremely vexed when apprised of these circumstances, immediately took steps to recover the picture, in which she was assisted by Mr. Gilbert. It was ascertained that a person of the name of Newton, lodging at a hair-dresser's at Bayswater, had been employed to engrave the Portrait. Mr. Gilbert repaired to the engraver's lodgings, but heard, to his consternation, that Mr. Newton had recently left the house considerably indebted to his landlord, and had carried away all his property. The landlady, however, upon being questioned, admitted that her late lodger had left an old dirty picture in his rooms, which she ordered her servant to bring down stairs. This proved to be Davy's Portrait, scarcely recognizable from being coated with dust. For the sum of 10*l.* the landlady cheerfully consented to part with the picture, which was of little or no value in her estimation, and Mr. Gilbert had the great satisfaction of bearing it away on the *roof of a cab*, to the destination originally intended for it.

humble that he was unable to purchase apparatus for philosophical experiments—now at the head of the first scientific body in his country, where he was placed by the suffrages of nobles, philosophers, and *lite rati.*

At the ordinary Meeting immediately following the Anniversary, the new President delivered an Address, which it has been judged advisable to insert at length, as not only illustrating the actual condition of the Royal Society, but also throwing considerable light upon Davy's views respecting science, and the objects of the Society over which he was called to preside. This Meeting, which was composed of a very large number of Fellows, was also attended by men who have since won for themselves an immortal reputation, but who were not at that time Fellows of the Society:—

"*Discourse on the Present State of the Royal Society, and on the Progress and Prospects of Science, delivered by Sir H. Davy, Bart., on taking the Chair, at the Ordinary Meeting on the 7th December,* 1820.

"GENTLEMEN,

"I HAVE, on a former occasion[37], returned you my thanks for the distinguished honour you have done me in electing me your President. I have stated to you my entire devotion to your interests, and to the cause of science. I do not mean to indulge in any further expression of my feelings on this occasion, except to say, that they are deep, and will be permanent.

"But I think it my duty, before I enter upon the details of common business, to devote a few words to the present state of the Royal Society, its relations to other scientific bodies, and the prospects and hopes of science.

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[37] At the Anniversary Dinner, November 30.

"In the early periods of our establishment, when apparatus was procured with difficulty, when the greatest philosophers were obliged to labour with their own hands to frame their instruments, it was found expedient to keep in the rooms of the Society a collection of all such machines as were likely to be useful in the progress of experimental knowledge: and curators and operators were employed, by whom many capital experiments were made under the eyes of the Society. But since the improvement of the mechanical and chemical arts have afforded great facilities as to the means of carrying on experimental research, the Transactions of the Fellows, recorded by the Society, have, with some few exceptions, been performed in their own laboratories, and at their own expense. It is, however, possible that experiments of great importance, requiring funds which few individuals can command, may be suggested; and it is to be hoped that, on such occasions, the proposers will not fail to recur to the Society. Government, by the command of our august patrons, has always been found ready to assist us, when our inquiries have been connected with objects of national interests; and, on inferior occasions, the aid required might be afforded by an union of the Fellows, many of whom, from their situation in public establishments for teaching and diffusing natural knowledge, have opportunities of procuring the use of grand and expensive apparatus.

"When the Royal Society was instituted, it stood alone in Britain; and the associations of learned men that were formed soon after, in different parts of the empire, for pursuing natural science, were either dependent or affiliated societies. But, in these latter times, the field of knowledge has become so extensive, and its objects so various, that separate and independent bodies have arisen for registering observations or collecting facts, each in a different department. It would be impossible that our records, as they are now published, at our own expense, should contain histories of the multifarious phenomena of all the kingdoms of nature, of all the observations made in zoology, botany, mineralogy, geology, and practical astronomy. It is satisfactory, therefore, to know that institutions exist for preserving and publishing such histories in detail.

"I trust that, with these new societies, we shall always preserve the most amicable relations, and that we shall mutually assist each other; and that they, recollecting our grand object, which is, to establish principles on inductive reasoning and experiments, and to make useful applications in science, will, should any discoveries be made by their members respecting general laws, or important facts observed, which seem to lead to purposes of direct utility, do us the honour to communicate them to us. They will have no dishonourable place in being published in those records, which remain monuments of all the country has possessed of profound in experimental research, or ingenious in discovery, or sublime in speculative science, from the time of Hooke and Newton, to that of Maskelyne and Cavendish.

"I am sure there is no desire in this body to exert anything like patriarchal authority, in relation to these institutions, or indeed, if there were such a desire, it could not be gratified. But I trust there may exist in the new societies, that feeling of respect and affection for the Royal Society which is due to the eldest brother, to the first-born of the same family; and that we shall co-operate, in perfect harmony, for one great object, which, from its nature, ought to be a bond of union and of peace, not merely amongst the philosophers of the same country, but even amongst those of different nations.

"When, by the unrivalled power of one great genius, and the industry and talent of his illustrious disciples, the laws of the motions of the great masses of matter composing the universe were discovered, and most of the physical phenomena connected with them solved, it appeared as if the field of scientific research were exhausted, as if the rich crops taken from the soil had rendered it steril, and that little was left for the ingenuity and labour of future inquirers; time, however, has proved how unfounded was this opinion, and how nearly approaching to infinite are the objects of natural philosophy. Scarcely has any period of thirty years passed, without offering a train of important discoveries, and every new truth or new fact has led to new researches; becoming, as it were, a centre of light, from which rays have proceeded in different directions, showing to us unexpected objects; so that this kind of knowledge is as inexhaustible as the resources of the human mind; and philosophers, like the early cultivators in a great new continent, by every acquisition they make, discover new and extensive uncultivated spots beyond. As a chart of what is known in lately-discovered regions is essential in guiding the traveller to new researches, so, in natural knowledge, notices of the limits or boundary lines of different new departments of science, and of the aspects and characters of novel objects, may be useful to scientific investigators; I shall, therefore, offer a few hints respecting those different departments of inquiry which appear most capable of improvement.

"In pure Mathematics: though their nature, as a work of intellectual combination, framed by the highest efforts of human intelligence, renders them incapable of receiving aids from observations of external phenomena, or the invention of new instruments, yet they are, at this moment, abundant in the promise of new applications; and many of the departments of philosophical inquiry which appeared formerly to bear no relation to quantity, weight, figure, or number, as I shall more particularly mention hereafter, are now brought under the dominion of that sublime science, which is, as it were, the animating principle of all the other sciences.

"When the boundary of the solar system was enlarged by the discovery of the Georgium Sidus, and the remote parts of space accurately examined by more powerful instruments than had ever before been constructed, there seemed little probability that new bodies should be discovered nearer to our earth than Jupiter; yet this supposition, like most others in which our limited conceptions are applied to nature, has been found erroneous. The discoveries of Piazzi, and those astronomers who have followed him, by proving the existence of Ceres, Pallas, Vesta, and Juno—bodies smaller than satellites, but in their motions similar to primary planets —have opened to us new views of the arrangement of the solar system. Astronomy is the most ancient, and the nearest approaching to perfection of the sciences; yet, relating to the immensity of the universe, how unbounded are the objects of inquiry it presents! And, amongst them, how many grand and abstruse subjects of investigation! Such, for instance, as the nature of the systems of the fixed stars and their changes, the relations of cometary bodies to the sun, and the motions of those meteors which, in passing through our atmosphere, throw down showers of stones; for it cannot be doubted that they belong to the heavens, and that they are not fortuitous or atmospheric formations; and, in a system which is all harmony, they must be governed by fixed laws, and intended for definite purposes.

"The grand question of universal gravitation, and its connexion with the figure of the earth, has been long solved; but the mechanical refinements of one of our Fellows, have afforded means of estimating, with more perfect exactness, the force of gravity: and that pendulum, which is so well fitted as a standard of measure, may be admirably applied in acquainting us with the physical constitution of the surface of the earth. I trust we shall have some interesting new experiments on the subject. Our brethren of the Royal Academy of Sciences of Paris, who have laboured with so much zeal and activity towards the measurement of a great arc of the meridian in France and Spain, are, I know, extremely desirous their measures may be connected with those carried on by the command of the Board of Ordnance in Britain,—That the work may be completed by the philosophers of both countries. Should this be done, there will be established, on the highest authority, an admeasurement of nearly 20 degrees, or $\frac{1}{18}$th of the whole circumference of the earth, from the Shetland Islands to Formentera, which will be a great record for posterity, and an honour for our own times.

"I cannot pass over the subject of the figure of the earth without referring to the late voyage to the Arctic Regions, which has shewn that there is an accessible sea to the west of Baffin's Bay, presenting hopes of other discoveries, and which, though unsuccessful in its immediate objects, has terminated, nevertheless, in a way equally honourable to those by whom the expedition was planned, and to the brave, enterprising, and scientific navigators by whom it was executed. Such expeditions are worthy of the great maritime nation of the world, showing that her resources are not merely employed for gaining power or empire, but likewise for what men of science must consider as nobler purposes, the attempting discoveries which have the common benefit of mankind for their object, and the extension of the boundaries of science.

"In the theory of light and vision, the researches of Huyghens, Newton, and Wollaston, have been followed by those of Malus; and the phenomena of polarization, which we owe to the genius of that excellent and much-to-be-lamented philosopher, are constantly leading to new discoveries; and, notwithstanding the important labours of Arago, Biot, Brewster, and Herschel, the inquiry is not yet exhausted; and it is extremely probable, that these beautiful results will lead to a more profound knowledge than has hitherto been obtained concerning the intimate constitution of bodies, and establish a near connexion between mechanical and chemical philosophy.

"The subject of heat, so nearly allied to that of light, has lately afforded a rich harvest of discovery; yet it is fertile in unexplored phenomena. The question of the materiality of heat will probably be solved at the same time as that of the undulatory hypothesis of light, if, indeed, the human mind should ever be capable of understanding the causes of these mysterious phenomena. The applications of the doctrine of heat to the atomic or corpuscular philosophy of chemistry, abound in new views, and probably, at no very distant period, these views will assume a precise mathematical form. There are many remarkable circumstances which seem to point to some general law on the subject:—first, the apparent equable motion of radiant matter, as light and heat, through space; second, the equable expansion of all elastic fluids, by equal increments of temperature; third, the contraction or expansion of gases, by chemical changes, in some direct ratio to their original volume, for instance, $\frac{1}{2}$ or $\frac{1}{3}$; fourth, the circumstance that the elementary particles of all bodies appear to possess the same quantity of heat.

"In electricity, the wonderful instrument of Volta has done more for the obscure parts of physics and chemistry, than the microscope ever effected for natural history, or even the telescope for astronomy. After presenting to us the most extraordinary and unexpected results in chemical analysis, it is now throwing a new light upon magnetism,

Suppeditatque novo confestim lumine lumen.

But upon this question I shall enter no further, as it has been discussed, in the Discourse given on the award of the Copleian medal to M. Oersted, by my predecessor in office, with all his peculiar sagacity and happy talent of illustration.

"To point out all the objects worthy of inquiry in chemistry, would occupy the time appropriated to many sittings of the Society. I cannot, however, avoid mentioning, amongst important desiderata, the knowledge of the nature of the combinations of that principle existing in fluor, or Derbyshire spar, and which has not yet been obtained pure; the relations of that extraordinary fact, the metallization of ammonia, and the connexion between mechanical and chemical phenomena, in the action of voltaic electricity. I must congratulate the

Society on the rapid advances made in the theory of definite proportions, since it was advanced in a distinct form, by the ingenuity of Mr. Dalton. I congratulate the Society on its progress, and on the promise it affords of solving the recondite changes, owing to motions of the particles of matter by laws depending upon their weight, number, and figure, and which will be probably found as simple in their origin, and as harmonious in their relations, as those which direct the motions of the heavenly bodies, and produce the beauty and order of the celestial systems.

"The crystallizations, or regular forms of inorganic matter, are intimately connected with definite proportions, and depend upon the nature of the combinations of the elementary particles; and both the laws of electrical polarity, and the polarization of light, seem related to these phenomena. As to the origin of the primary arrangement of the crystalline matter of the globe, various hypotheses have been applied, and the question is still agitated, and is perhaps above the present state of our knowledge; but there are two principal facts which present analogies on the subject, one, that the form of the earth is that which would result, supposing it to have been originally fluid; and the other, that in lavas, masses decidedly of igneous origin, crystalline substances, similar to those belonging to the primary rocks, are found in abundance.

"In following the sensible phenomena of nature, from the motions of the great masses of the heavenly bodies which first impress the senses and affect the imagination, to the changes individually imperceptible, which produce the results of crystallization, there is a regular gradation, and a series conformable to analogy; and where crystallization ends, another series, that of animated nature, begins, governed by a distinct set of laws, but obedient to a principle, the properties of which, independent of matter, can never be submitted to human observation. The functions and operations of organized beings, however, offer an infinite variety of beautiful and important objects of investigation. For instance, in those refined chemical processes, by which the death and decay of one species afford nourishment to another and higher order, by which the water and inert matter of the soil and the atmosphere are converted into delicately-organized structures, filled with life and beauty. In vegetable physiology, how many phenomena still remain for investigation! the motion of the sap, the functions of the leaves, for instance, and the nature of the organs of assimilation. In animal physiology, the subjects are still more varied, more obscure, and of a higher character. May we not hope those philosophers of the schools of Grew and Hunter, who have already done so much for us, will not cease their efforts for the improvement of these branches of science, which are not merely important in their philosophical relations, but of great utility, the one to agriculture, the other to medicine?

"Gentlemen, to conclude, I trust in all our researches we shall be guided by that spirit of philosophy, awakened by our great masters, Bacon and Newton; that sober and cautious method of inductive reasoning which is the germ of truth and of permanency in all the sciences. I trust that those amongst us who are so fortunate as to kindle the light of new discoveries, will use them, not for the purpose of dazzling the organs of our intellectual vision, but rather to enlighten us, by showing objects in their true forms and colours; that our philosophers will attach no importance to hypotheses, except as leading to the research after facts, so as to be able to discard or adopt them at pleasure, treating them rather as parts of the scaffolding of the building of science, than as belonging either to its foundations, materials, or ornaments; that they will look, where it be possible, to practical applications in science, not, however, forgetting the dignity of their pursuit, the noblest end of which is, to exalt the powers of the human mind, and to increase the sphere of intellectual enjoyment, by enlarging our views of nature, and of the power, wisdom, and goodness of the Author of nature.

"Gentlemen, the Society has a right to expect from those amongst its Fellows, gifted with adequate talents, who have not yet laboured for science, some proofs of their zeal in promoting its progress; and it will always consider the success of those who have already been contributors to our volumes, as a pledge of future labours.

"For myself, I can only say, that I shall be most happy to give in any way assistance, either by advice or experiments, in promoting the progress of discovery. And though your good opinion has, as it were, honoured me with a rank similar to that of general, I shall be always happy to act as a private soldier in the ranks of science.

"Let us then labour together, and steadily endeavour to gain what are perhaps the noblest objects of ambition—acquisitions which may be useful to our fellow-creatures. Let it not be said, that, at a period when our empire was at its highest pitch of greatness, the sciences began to decline; let us rather hope that posterity will find, in the Philosophical Transactions of our days, proofs that we were not unworthy of the times in which we lived."

The history of the Society, during the Presidency of Sir Humphry Davy, attests the high scientific labours and energy of its Fellows. Papers by Herschel, Davy, Ivory, Brinkley, Airy, Buckland, Wollaston, Young, Sabine, Kater, Dalton, Babbage, Brewster, Brande, Faraday[38], Roget, Home, Christie, &c. &c.; men to whom we may aptly apply the words of Virgil:—

> "Inventas aut qui vitam excoluere per artes;
> Quique sui memores alios fecere merendo,"

are to be found in the *Transactions*. Dr. Buckland's communication "On the fossil teeth and bones discovered in a cave at Kirkdale[39]," merits distinct notice, on account of the Copley Medal having been awarded to the author for the geological discoveries which are detailed in that Paper[40], and also as affording evidence that the President and Council were fully alive to the importance of the Doctor's favourite science. Sir Humphry Davy's own views on this subject are propounded in his Address to Dr. Buckland :—

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[38] The reader may be interested to know, that the first Paper by this great Chemist, "On two new compounds of Chlorine and Carbon," was read on the 21st December, 1820, only a few days after the election of Davy to the chair. Dr. Faraday was at *that* time, as he says in a letter to me, "but a little man amongst other philosophers." Now, his name will go down to posterity with those in the foremost rank of fame.

[39] *Philosophical Transactions*, 1822.

[40] Dr. Buckland's geological labours are well known to the scientific world. How they commenced, appears by the following extract from Sir Henry De la Beche's Anniversary Address to the Geological Society in 1848. On presenting the Wollaston Medal to Dr. Buckland, he observed:—"It may not be generally known, that, while yet a child, at your native town, Axminster in Devonshire, Ammonites obtained by your father from the lias-quarries in the neighbourhood, were presented to your attention. As a scholar at Winchester, the chalk, with its flints, were brought under your observation, and there it was that your collections in natural history first began. Removed to Oxford as a scholar of Corpus Christi College, the future teacher of geology in that

"Receive this medal as a proof of the high estimation in which your labours and researches are held by a

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university was fortunate in meeting with congenial tastes in our colleague, Mr. W. J. Broderip, then a student at Oriel College. It was during your walks together to Shotover Hill, when his knowledge of conchology was so valuable to you, enabling you to distinguish the shells of the Oxford oolite, that you laid the foundation for those field-lectures, forming part of your course of geology at Oxford, which no one is likely to forget who has been so fortunate at any time to have attended them. The fruits of your walks with Mr. Broderip formed the nucleus of that great collection, more especially remarkable for the organic remains it contains, which, after the labours of forty years, you have presented to the Geological Museum at Oxford, in grateful recollection of the aid which the endowments of that university, and the leisure of its vacations, had afforded you for extensive travelling during a residence at Oxford of nearly forty-five years.

"When you contemplate our present knowledge of the geological structure of the British Islands, it cannot be without gratification that you can look back to your early labours in promoting it. It was so long since as 1808, that alone you crossed the chalk-downs of Berkshire, Wiltshire, and Dorsetshire, to Corfe Castle, there recognizing chalk in the vertical position of the hard white limestones on which the latter stands. Alone, also, in 1809, you explored a large part of South Devon; in 1810, you examined the centre and north of England, colouring the results of your researches upon Cary's great Map of England; and in 1811, you extended your investigations to part of Scotland, crossed over to Ireland, and returned home by North Wales. About this time, we find you associated with Mr. Greenough, collecting materials for his Geological Map of England; and it must be no small gratification for you to see as witnesses of this presentation of the Wollaston Medal, your early fellow-labourer in the Geology of England, and our first President, Mr. Greenough."

body which, I believe, is very impartial in its decisions, and which, I trust, looks to the actual progress science has made, rather than to the person, school, or nation, to whom it has been owing. I know I need not urge you to a further pursuit of these inquiries, by which you have gained distinction and so much merited popularity. You are, I am sure, devoted to them, and I only wish you health to enable you to pursue them; for I am convinced the longer you live, the more extended will be the obligations you will confer on the world of science. I hope your example will stimulate some of the younger Fellows of this Society to similar researches. It is still, as it was originally, the Royal Society for the improvement of natural knowledge, and we have been, and always are, most happy to receive important facts, laws, and principles, respecting the mineral history of the Earth; we deeply feel the use and the importance of such inquiries—in their relations to the progress of the arts, as well as to the sublimer speculations of philosophy[41]."

Copley Medals were awarded, in 1821, to Sir John Herschel and Captain (now Colonel) Sabine; to the former, for his philosophical communications to the Society, and to the latter, for his researches during his Arctic Expedition, when, in the words of Sir Humphry Davy, "his experiments were principally conducted on the ice of the polar sea, when the vessel was for several months frozen up; during a considerable portion of time he was in darkness, or only guided by a very doubtful twilight, and the temperature, probably as cold as any belonging to the northern hemisphere, was such, that the artificial horizon of mercury became frozen during an observation; yet Captain Sabine's inquiries seem to have been conducted with as much care and precision, as if he had been possessed of the conveniences and luxuries of a Royal Observatory, and the advantages and repose of the happiest climate and situation[42]."

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[41] Journal-book, Vol. XLIII. p. 518.

But the labours of the Society were not confined to the mere reading and publishing of Papers. Scientific Committees, formed at the request of Government, deliberated and reported upon various matters of deep public importance; and it is almost unnecessary to say, that the most eminent scientific men generously gave their time and knowledge on these occasions[43].

In the early part of 1821, a communication was received from the Royal Academy of Sciences, and the Board of Longitude at Paris, expressing their desire that the trigonometrical operations for connecting the meridians of Paris and Greenwich, first carried on by General Roy in co-operation with Messrs.

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[42] Anniversary Discourse.

[43] The plan of this history prevents noticing the labours of several Committees appointed at the request of Government subsequently to 1830. Amongst these may be mentioned, the "Excise Committee," composed of our most eminent chemists. This Committee were engaged at different periods for upwards of four years in making hydrometrical experiments with reference to the duties on spirits. For their labours, the Society received "The best thanks of the Lords Commissioners of Her Majesty's Treasury for the obliging manner in which they have met the wishes of the Board, and for the attention which they have given to the subject, and for the valuable reports with which they have furnished this Board."

de Cassini, Mechain, and Legendre, in the year 1790, should be repeated. The Council responded to this application by the following resolution :—

"Resolved, that the distance between Dover and Calais has never been accurately ascertained. It is evident that the distance is an object of importance both to Great Britain and to France, not only in its connexion with the means of communication between the two countries, but likewise from the relations it may assume to important questions in Geography, Astronomy, and Navigation. The President and Council feel anxious that this operation should be commenced as soon as possible, both on account of the advancement of science, and as an undertaking honourable to both countries, as tending to promote that harmony and liberal intercourse between them so important for their great interest, and those of the civilized world."

In accordance with this resolution, Colonel (now General) Colby and Captain Kater were nominated Commissioners by the Royal Society, to act with MM. Arago and Mathieu, appointed on the part of the Academy of Sciences. The instrument employed in the operations was the great theodolite of Ramsden, belonging to the Royal Society. The signals used for connecting the stations on the coasts of England and France were lamps with compound lenses, constructed under the direction of M. Fresnel. These lenses were three feet in diameter, and composed of numerous pieces; the light far exceeded that given by light-houses, and is stated to have appeared, at the distance of 48 miles, like a star of the first magnitude.

After ascertaining the distance across the channel, the observers selected stations for the purpose of connecting the triangles with the Observatory at Greenwich. Observations were made from Leith Hill, Wrotham Hill, Stede Hill, Crowborough, and Severndroog Castle, on Shooter's Hill, which were connected with Greenwich by the N.W. pinnacle of Westminster Abbey, and the cross of St. Paul's, and afterwards by means of Hanger Hill, with Fairlight Down and Folkstone Turnpike. A difficulty occurred in observing from the station on Shooter's Hill the signal-staff erected upon Hanger Hill, in consequence of the intervening smoke of London. This was obviated by a very ingenious contrivance of Colonel Colby, consisting of several tin plates nailed to the staff, and disposed one above another at such angles, as to reflect in succession the sun's rays in the direction of Shooter's Hill, and thus to answer the purpose of a heliostat. Each plate gave in its turn an image of the sun, resembling a fixed star, which was seen through a smoke so thick, as to render the hill itself invisible. The preservation of the stations was felt to be an object of considerable importance; and stones were procured for each about one foot square, and four or five feet long. These were sunk endways until they were level with the ground, and had the word 'Station' and the date of the year cut upon them. But other measures were taken to record the true position of the Stations, which were in all practicable cases fixed by angles formed by steeples or other permanent objects in the vicinity. A detailed account of the operations was drawn up by Captain Kater, and published in the *Philosophical Transactions* for 1828. The original observations, &c. relating to the work, are preserved in the Archives of the Society.

In 1822, a letter was received from the Admiralty, praying the Council to appoint a Committee to report upon the advantages, or the contrary, of the use of coal-tar in vessels of war. Representations had been made to the Admiralty by naval captains, that "the most dangerous and pernicious consequences resulted from the use of coal-tar" on board H.M. ships, which led the Admiralty to apply to the Royal Society for their scientific opinion. A Committee was accordingly appointed, consisting of Sir H. Davy, Mr. Gilbert, Mr. Brande, Mr. Hatchett, Mr. Herschel, Dr. Marcet, Dr. Wollaston, and Dr. Young. Our limits preclude doing more than stating that the Committee reported on the 4th July, 1822, to the effect that coal-tar was not prejudicial[44].

In the same year, a Committee was appointed "to examine into the cause of the errors discovered in the mural circle at the Royal Observatory at Greenwich, and into the state of the instruments there." Another, to report to the Admiralty upon the best manner of measuring the tonnage of ships. In January, 1823, the following letter was received from the Admiralty:—

"Sir, "*Navy Office*, 21 *January*, 1823.

"Our attention having on several occasions been called to the very important consideration of the copper sheets now in use in H.M. service, and experiments having been made, from time to time, by our directions, without producing any result calculated to guide our judgment, it now becomes indispensably necessary to obtain such information as may enable us to adopt the best means of securing to the service, copper of the most durable quality, and such as will preserve the smoothest surface.

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[44] See Council-minutes, Vol. x. p. 4.

"Upon a matter of such serious importance to the character of the Naval Service and the best interests of the country, it would be idle to regulate our investigations and experiments upon this subject, by any consideration short of the most complete and effectual way of coming at the desired information; and with this view we are particularly desirous of availing ourselves of the talents of the most scientific men in the kingdom, and those whose knowledge of chemistry would be likely to detect any imperfection in the present mode of manufacturing copper. Under such circumstances, we hope we may be permitted to request the favour of your advice and assistance on the occasion, and that you will be kind enough to undertake an investigation of the subject, with a view to recommend what steps it may be proper to pursue.

"Any information it may be in our power to afford shall be furnished, if you will have the goodness to point out what you may deem requisite for the undertaking. In the mean time we propose to collect, and shall take the liberty to submit to you, all the information which the records of office afford with respect to copper.

"We are, &c.
"T. B. Martin,
"R. Seppings,
"P. Fraser.

"*To Sir H. Davy, Bart., P.R.S.*"

This letter is introduced here, being the document which led to the appointment of a Committee consisting of Sir. H. Davy, Mr. Brande, Mr. Combe, Mr. Hatchett, Sir J. Herschel, and Dr. Wollaston, and to the inquiries and experiments made by Davy on the corrosion of copper-sheathing by sea-water, and on methods of preventing this effect. Indeed, Sir Humphry took all the labours of the inquiry upon himself. The results appeared in three very elaborate Papers read before the Society in 1824 and 1825[45]. In January, 1824, Davy communicated to Government the important fact of his having discovered a remedy for the evils attendant upon the system of copper-sheathing, by rendering the copper electro-positive, by means of the contact of tin, zinc, lead, iron, or any other easily oxidable metal, which would prevent the corrosion of the copper. He added, that he was fully prepared to carry his plan into execution[46].

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[45] Trajan's ship in Lake Nemi, after lying sunk more than 1400 years, was found sheathed with lead; and Sir Hugh Willoughby's unfortunate ships were so protected in 1550. Sheathing in lead was discontinued about the beginning of the 18th century, on account of its wearing away irregularly, and sheathing with wood was adopted instead. In 1708, a proposal was made to the Navy Board to sheath ships with copper, which was rejected without a trial. Mr. Knowles, in his *Inquiry into the means which have been taken to preserve the British Navy*, conceives that the earliest sheathing was probably the hides of animals covered with pitch. It was in 1761 that the first ship of war was coppered. Within the following twenty years all H. M. ships were sheathed with copper.

[46] The "protectors" were bars of iron six inches wide at their base, three inches in thickness at their centre, and in outward form the segment of an extended circle. They were usually placed on each side of a ship in a horizontal position, viz., in midships about 3 ft. under water, on the keel in a line with these, and the remainder in the fore and after-parts of the ship about 3 ft. under the line of floatation, as far forward and abaft as the curvatures of their respective bodies would allow of their lying flat upon the surface of the copper. It is worthy of remark, that it was subsequently found that the protectors acted more powerfully when placed vertically. Davy eventually preferred zinc to iron as the protecting metal.

"A proposition," says Dr. Paris, "from a philosopher of such known science, and upon a subject of such great importance to the navigation and commerce of the country, immediately obtained all the attention it deserved; and an order was made that the plan of protection should, under the superintendence of Sir H. Davy, be forthwith tried upon the bottom of a sailing-cutter. To give his discovery farther publicity, Sir Humphry requested that three models of ships might be exhibited in the spacious hall of the Navy Office in Somerset House; the copper of one of which he proposed should be protected by bands of zinc, that of another by plates of wrought iron soldered on the sheathing, while the third should have its copper exposed, without any protection whatever.

These models were floated in sea-water for several months; and the experiments fully confirmed the results he had previously obtained in his laboratory. The models were from time to time examined by persons of the highest scientific character, as well as by others of great naval celebrity; and so alluring was the theory, and so conclusive the experiments, that instead of waiting the result of the slow, but more certain ordeal to which the plan had been submitted, it was immediately put into extensive practice both in the Government service, and on the bottoms of ships belonging to private individuals[47]." But, as Dr. Paris observes, "at length, paradoxical as it may appear, the truth of his theory was completely established by the failure of his remedy." The copper was indeed protected from corrosion, but an unlookedfor evil of another kind speedily arose. The bottoms of the protected ships soon became extremely foul. The negative state of the copper-sheathing favoured the deposition of the calcareous matter from sea-water, the growth of sea-weed, and the adhesion of marine shell-fish and insects. The plan received a fair trial. In May, 1824, an order was issued to protect in future the copper-sheathing of H.M. ships which might be taken into dock on Sir H. Davy's principle. It, however, became evident shortly after the ships so protected went to sea, that their bottoms had become very foul; and on examination, it was discovered that the sheathing was completely covered with vegetable and animal marine matter. When the incrustations were removed, the sheets of copper were found to have suffered little or no loss, thus verifying Sir H. Davy's theory of protection.

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[47] *Life*, p. 404.

The disadvantages arising from the foulness of ships' bottoms are so great, that Government was obliged to issue an order in July, 1825, prohibiting any more vessels from being fitted with the protectors. It was only in the previous month that Sir Humphry had read an elaborate memoir on the subject before the Royal Society, and the Navy order for the discontinuance of the protectors following so soon, was a source of great mortification to him; for there is no doubt that he fully expected honours and fame to crown his discovery. Indeed, the disappointment is stated, by all who knew him, to have exercised a decided and marked influence on his character. His vexation was increased by attacks made upon him in various publications, by individuals actuated more by feelings of envy than love of science. In a letter to Mr. Children he says: "I am irritated by these more than I ought to be; but I am getting wiser every day, recollecting Galileo, and the times when philosophers and public benefactors were burnt for their services."

In his last Bakerian lecture, read on the 8th June, 1826, "On the relation of Electrical Changes," he thus alludes to the subject of voltaic protection: "A great variety of experiments have proved the full efficacy of the electro-chemical means of preserving metals, particularly the copper-sheathing of ships; but a hope I had once indulged, that the peculiar electrical state would prevent the adhesion of weeds or insects, has not been realized[48]."

"Had not the health of Davy," says Dr. Paris, "unfortunately declined at the very period when his energies were most required, such is the unbounded confidence which all must feel in his unrivalled powers of vanquishing practical difficulties, and of removing the obstacles which so constantly thwart the applications of theory, that little doubt can be entertained but he would soon have discovered some plan by which the adhesion of marine bodies to the copper-sheathing might have been prevented, and his principle of voltaic protection thus rendered available[49]."

In the early part of 1822, the Council took into their most serious deliberation the importance of continuing the astronomical observations at Greenwich during the whole of the twenty-four hours, and eventually passed a resolution, urging the Lords of the Admiralty to give additional assistance to

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[48] *Philosophical Transactions*, 1826, p. 420.

[49] *Life*, p. 435.

Mr. Pond, the Astronomer-Royal, for the purpose of carrying out the views of the Council.

A long correspondence ensued, the result of which was, that Government "concurred in the proposed extension of the establishment at Greenwich;" and, moreover, gave the Council power to select the necessary officers. "From the beginning of Flamsteed's superintendence to the end of Maskelyne's, one assistant only was attached to the Observatory. During Pond's superintendence, the number was gradually increased to six. With these assistants the observations can be kept up without difficulty at all hours, which are necessary; but they are hardly sufficient for completing the mass of calculations which the observations require, and for carrying on the rating, as well as the business of other kinds connected with the Government chronometers[50]." All the observations made under the superintendence of Mr. Pond were forwarded to the Royal Society, and published at the public expense by the Society. They form ten large folio volumes.

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[50] Airy: *article*, Greenwich Observatory, *Penny Cyclopædia*. From 1766, when Harrison's improved watch, or chronometer, was first tried, to the present time, an immense number of chronometers of different constructions have undergone trials at the Royal Observatory. I have seen several dozens in the rating room, some surrounded by ice, others in high temperatures, to test their compensation principles.

CHAPTER XI.

The Society receive a Letter from the Treasury respecting Mr. Babbage's Calculating Machine—Letter from Mr. Babbage to Sir H. Davy—A Committee appointed to consider Mr. Babbage's Plan—They Report in favour of it—Mr. Babbage has an interview with the Chancellor of the Exchequer—Government advance 1,500*l.*—Difference-Engine commenced—Mr. Babbage gives all his labour gratuitously—Advice of the Society again requested—Mr. Babbage's Statement—Committee appointed to inspect the Engine—Their Report—Heavy Expenses not met by the Treasury—Meeting of Mr. Babbage's personal friends—Their Report—Duke of Wellington inspects the Works—His Grace recommends the Treasury to make further Payments—Letter from Mr. Babbage to the Treasury—Communication from the Treasury to the Council—Referred to a Committee—Report of Committee—They recommend the Works to be removed to the vicinity of Mr. Babbage's Residence—Government act on the Recommendation—Fire-Proof Buildings erected—Misunderstanding with Mr. Clement—Works stopped—Mr. Babbage discovers new principles which supersede those connected with the Difference-Engine—He requests an interview with Lord Melbourne—Letter to M. Quetelet explaining the principles of Analytical-Engine—Mr. Babbage visits Turin—M. Menabrea's Account of the Engine—Translated with Notes by Lady Lovelace—Mr. Babbage applies to Government for their Determination—Letter from the Chancellor of the Exchequer—Mr. Babbage's Answer—Government resolve not to proceed with the Engine—Mr. Babbage has an interview with Sir R. Peel—Difference-Engine placed in the Museum of King's College—Present State of the Analytical-Engine.

1820—25.

ON the 1st April, 1823, a letter was received from the Treasury, requesting the Council to take into consideration a plan which had been submitted to Government by Mr. Babbage, for "applying machinery to the purposes of calculating and printing mathematical tables;" and the Lords of the Treasury further desired "to be favoured with the opinion of the Royal Society on the merits and utility of this invention[1]."

This is the earliest allusion to the celebrated Calculating Engine of Mr. Babbage, in the records of the Society[2]. But the invention had been brought before them in the previous year by a letter from Mr. Babbage to Sir H. Davy, dated July 3rd, 1822, in which he gives some account of a small model of his engine for calculating differences, which "produced figures at the rate of 44 a minute, and performed with rapidity and precision all those calculations for which it was designed[3]." He then proceeds to enumerate various tables which the machine was adapted to calculate, and concludes: "I am aware that these statements may perhaps be viewed as something more than Utopian, and that the philosophers of Laputa may be called up to dispute my claim to originality. Should such be the case, I hope the resemblance will be found to adhere to the nature of the subject, rather than to the manner in which it has been treated. Conscious from my own experience of the difficulty of convincing those who are but little skilled in mathematical knowledge, of the possibility of making a machine which shall perform calculations, I was naturally anxious, in introducing it to the public, to appeal to the testimony of one so distinguished in the records of British science[4]. Induced by a conviction of the great utility of such engines, to withdraw for some time my attention from a subject on which it has been engaged during several years, and which possesses charms of a higher order, I have now arrived at a point where success is no longer doubtful. It must, however, be attained at a very considerable expense, which would not probably be replaced by the works it might produce for a long period of time, and which is an undertaking I should feel unwilling to commence, as altogether foreign to my habits and pursuits."

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[1] In the following account of the Difference and Analytical Engines, besides the MS. documents in the Archives of the Royal Society, I have derived very valuable information from an unpublished statement drawn up by Mr. Babbage, which he has been so kind as to place in my hands. The original documents which are in Mr. Babbage's possession, and which are referred to, I have myself examined.

[2] The idea of a Calculating Engine is not new. The celebrated Pascal constructed a machine for executing the ordinary operations of arithmetic, a description of which will be found in the *Encycl. Méthod.*, and in the Works of Pascal, Tom. IV. p. 7, Paris 1819. In his *Pensées* he says, alluding to this Engine: "*La machine arithmétique fait des effets qui approchent plus de la pensée que tout ce que font les animaux; mais elle ne fait rien qui puisse faire dire qu'elle a de la volonté comme les animaux.*" Subsequently, Leibnitz invented a machine by which, says Mr. De Morgan, "arithmetic computations could be made." Polenus, a learned and ingenious Italian, invented a machine by which multiplication was performed—and mechanical contrivances for performing particular arithmetical processes were made about a century ago, but they were merely modifications of Pascal's. These Engines were very different to Mr. Babbage's Difference-Engine.

The Council appointed a Committee to take Mr. Babbage's plan into consideration, which was composed of the following gentlemen: Sir H. Davy, Mr.

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[3] This letter was printed and published in July, 1822.

[4] Sir H. Davy had witnessed and expressed his admiration of the performances of the Engine.

Brande, Mr. Combe, Mr. Baily, Mr. (now Sir Mark Isambard) Brunel, Major (now General) Colby, Mr. Davies Gilbert, Mr. (now Sir John) Herschel, Captain Kater, Mr. Pond (Astronomer-Royal), Dr. Wollaston, and Dr. Young. On the 1st May, 1823, the Committee reported: "That it appears that Mr. Babbage has displayed great talents and ingenuity in the construction of his machine for computation, which the Committee think fully adequate to the attainment of the objects proposed by the inventor, and that they consider Mr. Babbage as highly deserving of public encouragement in the prosecution of his arduous undertaking[5]."

This Report was transmitted to the Lords of the Treasury, by whom it was, with Mr. Babbage's letter to Sir H. Davy, printed and laid before Parliament[6].

In July, 1823, Mr. Babbage had an interview with the Chancellor of the Exchequer, Mr. Robinson (now Earl of Ripon), to ascertain if it were the wish of Government that he should construct a large engine of the kind, which would also print the results it calculated. Unfortunately, no Minute of that conversation was made at the time, nor was any sufficiently distinct understanding arrived at, as it afterwards appeared that a contrary impression was left on the mind of either party[7]. Mr. Babbage's conviction was, that whatever might be the labour and difficulty of the undertaking, the engine itself would, of course, become the property of the Government, which had paid for its construction.

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[5] I am informed upon good authority, that Dr. Young differed in opinion from his colleagues. Without doubting that an engine could be made, he conceived that it would be far more useful to invest the probable cost of constructing such a calculating machine as was proposed, in the funds, and apply the dividends to paying calculators.

[6] Parliamentary Paper, No. 370, 1823.

[7] Mr. Babbage very justly observes, that had the mutual re-

Soon after this interview with the Chancellor of the Exchequer, a letter was sent from the Treasury to the Royal Society, informing them that the Lords of the Treasury "had directed the issue of 1500*l.* to Mr. Babbage, to enable him to bring his invention to perfection, in the manner recommended."

These words "*in the manner recommended*," can refer only to the previous recommendation by the Royal Society; but it does not appear from their Report, that any plan, terms, or conditions, had been pointed out.

Towards the end of July, 1823, Mr. Babbage took measures for the construction of the present Difference-Engine[8], and it was regularly proceeded with for four years.

And here it is right to state, that Mr. Babbage gave his mental labour gratuitously, and that from first to last he has not derived any emolument whatever from Government[9]. Sectional, and other drawings, of the most delicate nature had to be made;

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lations of the two parties, and the details of the plans then adopted, been clearly defined, there is little doubt but that the Difference-Engine would long since have existed.

[8] It will be desirable to distinguish between,

1. The small *Model* of the Original or Difference-Engine.
2. The Difference-Engine itself, belonging to the Government, a part only of which has been put together.
3. The designs for another Engine called the Analytical-Engine.

[9] Sir R. Peel distinctly admitted this in the House of Commons in March, 1843.

tools to be formed expressly to meet mechanical difficulties; and workmen to be educated in the practical knowledge necessary in the construction of the machine. The mechanical department was placed under the management of Mr. Clement, a draughtsman of great ability, and a practical mechanic of the highest order[10]. Money was advanced from time to time by the Treasury, the accounts furnished by the engineer undergoing the examination of auditors[11], and passing through the hands of Mr. Babbage. Thus years elapsed, and public attention became at length directed to the fact, that a large sum had been expended upon the construction of the engine, which was not completed. Again the advice of the Royal Society was solicited.

In December, 1828, Government begged the Council "to institute such enquiries as would enable them to report upon the state to which it (the machine) had then arrived; and also whether the progress made in its construction confirmed them in the opinion which they had formerly expressed, that it would ultimately prove adequate to the important object which it was intended to attain."

Accompanying this communication was a statement from Mr. Babbage of the condition of the engine, in which he says:—

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[10] A curious anecdote is related illustrative of the great perfection to which Mr. Clement was in the habit of bringing machinery. He received an order from America to construct a large screw in the *best possible manner*, and he accordingly made one with the greatest mathematical accuracy. But his bill amounted to some hundreds of pounds which completely staggered the American, who never calculated upon paying more than 20*l*. at the utmost for the screw. The matter was referred to arbitrators, who gave an opinion in favour of Mr. Clement.

[11] They were Messrs. Brunel, Donkin, and Field.

"The machine has required a longer time and greater expense than was anticipated, and Mr. Babbage has already expended about 6000*l.* on this object. The work is now in a state of considerable forwardness, numerous and large drawings of it have been made, and much of the mechanism has been executed, and many workmen are occupied daily in its completion."

A Committee was appointed by the Council, consisting of Mr. Gilbert (President), Dr. Roget, Captain Sabine, Sir John Herschel, Mr. Baily, Mr. Brunel, Captain Kater, Mr. Donkin, Mr. Penn, Mr. Rennie, Mr. Barton, and Mr. Warburton[12].

They minutely inspected the drawings, tools, and the parts of the engine then executed, and drew up a report, "declining to consider the principle on which the practicability of the machinery depends, and of the public utility of the object which it proposes to attain; because they considered the former fully admitted, and the latter obvious to all who consider the immense advantage of accurate numerical tables in all matters of calculation, which it is professedly the object of the engine to calculate and print with perfect accuracy."

They further stated, that "the progress made was as great as could be expected, considering the numerous difficulties to be overcome; and lastly, that they had no hesitation in giving it as their opinion, that the engine was likely to fulfil the expectations entertained of it by its inventor."

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[12] Colonel Sabine informs me, that Dr. Whewell was afterwards added to the Committee.

The Council adopted the Report, expressing their trust, that while Mr. Babbage's mind was intently occupied on an undertaking likely to do so much honour to his country, he might be relieved as much as possible from all other sources of anxiety.

It is clear that the Council of the Royal Society regarded Mr. Babbage's engine, as it then existed, in a favourable light, and were sanguine respecting its satisfactory completion.

Government acted on the foregoing Report; funds were advanced, the machinery was declared national property, and the works were continued. But there was evidently a misgiving on the part of the Lords of the Treasury, for the official payments soon failed to meet the heavy and increasing expenses incurred by Mr. Babbage.

Under these circumstances, by the advice of Mr. Wolryche Whitmore (Mr. Babbage's brother-in-law), a meeting of Mr. Babbage's personal friends was held on the 12th of May, 1829. It consisted of:—

The Duke of Somerset, F.R.S.,
Lord Ashley, M.P.,
Sir John Franklin, Capt. R.N., F.R.S.,
Mr. Wolryche Whitmore, M.P.,
Dr. Fitton, F.R.S.,
Mr. Francis Baily, F.R.S.,
Sir John Herschel, F.R.S.

They drew up the annexed Report:—

"*May* 12, 1829.

"THE attention of the undersigned personal friends of Mr. Babbage having been called by him to the actual state of his Machine for Calculating and Printing Mathematical Tables; and to his relation to the Government on the one hand, and to the Engineers and workmen employed by him in its execution on the other, declare themselves satisfied, from his statements and from the documents they have perused, of the following facts.

"That Mr. Babbage was originally induced to take up the work on its present extensive scale, by an understanding on his part, that it was the wish of Government that he should do so, and by an advance of 1500*l.* in the outset, with a full impression on his mind that such further advances would be made as the progress of the work should require, and as should secure him from ultimate loss.

"That the public and scientific importance of the Engine has been acknowledged, in a Report of a Committee of the Royal Society, made at the time of its first receiving the sanction of His Majesty's Government, and that its actual state of progess is such, as in the opinion of the most eminent Engineers and other Members of the Royal Society, as detailed in a further Report of a Committee of that body, to warrant their impression of the moral certainty of its success, should funds not be wanting for its completion.

"That it appears, that Mr. Babbage's actual expenditure has amounted to nearly 7000*l.* and that the whole sum advanced to him by the Government is 3000*l.*

"That Mr. Babbage has devoted, from the commencement of his arduous undertaking, the most assiduous and anxious attention to the work in hand, to the injury of his health, and the neglect and refusal of other profitable occupations.

"That a very large expense still remains to be incurred, to the probable amount of at least 4000*l.*, as far as he can foresee, before the Engine can be completed; but that Mr. Babbage's private fortune is not such as, in their opinion, to justify the sacrifices he must make in completing it without further and effectual assistance from Government; taking into consideration not only his own interest, but that of his family dependent on him.

"Under these circumstances, it is their opinion that a full and speedy representation of the case ought to be made to Government, and that in the most direct manner by a personal application to his Grace the Duke of Wellington.

"And that in case of such application proving unsuccessful in procuring effectual and adequate assistance, they must regard Mr. Babbage as no longer called on—considering the pecuniary and personal sacrifices he will then have made; considering the entire and *bonâ fide* expenditure of all that he will have received from the public purse on the object of its destination, and considering the moral certainty to which it is at length by his exertions reduced—as no longer called on to go on with an undertaking which may prove the destruction of his health, and the great injury if not the ruin of his fortune.

"That it is their opinion that Mr. W. Whitmore and Mr. Herschel should request an interview with the Duke of Wellington for the purpose of making this representation.

(Signed,) "SOMERSET.
"ASHLEY.
"JOHN FRANKLIN.
"W. W. WHITMORE.
"WM. HENRY FITTON.
"FRANCIS BAILY.
"J. F. W. HERSCHEL."

In consequence of what passed at this interview, which took place as suggested, the Duke of Wellington accompanied by the Chancellor of the Exchequer

(Mr. Goulburn) and Lord Ashley, inspected the *model* of the engine, the drawings, and parts in progress. The Duke recommended that a grant of 3000*l.* should be made towards the completion of the machine, which was duly paid by the Treasury.

In the mean time, difficulties of another kind arose. The engineer who had constructed the Engine under Mr. Babbage's directions, had delivered his bills in such a state, that it was impossible to judge how far the charges were just and reasonable; and although Mr. Babbage had paid several thousand pounds, there yet remained a considerable balance, which could not be liquidated until the accounts had been examined, and the charges approved by professional engineers.

With a view of drawing attention to these charges, Mr. Babbage addressed the following letter to the Chancellor of the Exchequer:—

"MY LORD, "*Dorset Street*, 21 *December*, 1830.

"I BEG to call your Lordship's attention to the enclosed account[13] of the expenses of the Machine for calculating and printing mathematical tables, by which it appears that a sum of 592*l.* 4*s.* 8*d.* remained

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[13]

	£.	*s.*	*d.*
Expense to end of 1824	600	0	0
Ditto „ „ 1827	521	16	9
Mr. Clement's Bills to June, 1827	4775	15	3
Ditto, 9th May, 1829	730	12	8
	6628	4	8
Deduct old tools sold	36	0	0
	6592	4	8
Mr. Clement's Bill to December, 1830, *about*..	600	0	0
	7192	4	8

due to myself upon the last account, and that a further sum of nearly 600*l.* has since become due to Mr. Clement.

"It is for the payment of this latter sum that I wish to call your Lordship's attention. Mr. Maudslay, one of the engineers appointed by the Government to examine the bills of Mr. Clement, having been unable from illness to attend, his report has been delayed, and Mr. Clement informs me that should the money remain unpaid much longer, he shall be obliged, from want of funds, to discharge some of the workmen; an event which I need not inform your Lordship would be very prejudicial to the progress of the machine.

"Another point which I wish to submit to your attention, when your Lordship shall have had leisure to examine personally the present state of the works, is, that since it is absolutely necessary to find additional room for the erection of the machine, it becomes a matter of serious consideration whether it would not contribute to the speedier completion of the machine, and also to economy in expenditure, to remove the works to the neighbourhood of my own residence.

"I have, &c.

"C. BABBAGE."

The receipt of this letter caused the Treasury to make the following communication to the Secretary of the Royal Society:—

"SIR, "*Treasury*, 24 *December*, 1830.

"THE Lords Commissioners of H. M. Treasury, having had under their consideration a letter from Mr. Babbage, containing an account of the expense which has been incurred in the construction of the Machine for calculating and printing mathematical tables, amounting to the sum of 7192*l.* 4*s.* 8*d.*, and requesting an advance of 600*l.* to defray a part of that expense; I am commanded by their Lordships to refer you to the Report of the Council of the Royal Society dated 16th February, 1829, which entirely satisfied their Lordships of the propriety of supporting Mr. Babbage in the construction of this machine, and to state that advances to the amount of 6000*l.* have been made on this account, and that directions have been given for a further advance of 600*l.*

"I am also to acquaint you, that the Machine is the property of Government, and consequently my Lords propose to defray the further expense necessary for its completion. I am further to request you will move the Council of the Royal Society to cause the machine to be inspected, and to favor my Lords with their opinion whether the work is proceeding in a satisfactory manner, and without unnecessary expense, and what further sum may probably be necessary for completing it.

"I am, &c.

"*The Secretary, Royal Society.*" "J. STEWART.

The consideration of this letter was referred to the same Committee which had previously been appointed for a similar purpose, with the addition of Sir John Lubbock and Mr. Troughton.

Again the Committee met[14] Mr. Babbage, at No. 21, Prospect Place, Lambeth (where the construction of the engine was carried on), and minutely inspected the machinery and drawings.

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[14] I have a letter of Sir J. Herschel's before me, expressing his regret at being unable to attend on this occasion, but that his faith in the engine and its inventor remained unshaken.

Their Report embodied the whole facts of the case:—the workmanship of the various parts of the machine was declared to have been executed with the greatest possible degree of perfection, and the pains taken to verify the charges on the part of the Government altogether satisfactory. It was recommended that the vacancy occasioned by the decease of Mr. Maudslay, who had been appointed to inspect the accounts, should be filled up by another engineer, conversant with the execution of machinery, and the value thereof. With respect to the suggested removal of the workshops nearer to Mr. Babbage's residence, the Committee gave their entire concurrence, on the ground that greater expedition would thereby be attained in carrying on the work, and that it was highly essential to secure all the machinery and drawings in fire-proof premises, without delay. A plot of ground held on lease by Mr. Babbage, adjacent to his garden at the back of his house in Dorset Street, was recommended as a desirable site for the contemplated erections, of which the plans and estimates had been submitted to the Committee. The framers of the Report stated in conclusion that:—

"Such an arrangement would be eminently conducive to the speedy and economical completion of the Machine, as well as to the effectual working and employment of the same, after it shall have been completed.

"That as to the sum which may be necessary for completing the Engine, they attach hereto the estimate of Mr. Brunel[15]."

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[15] Mr. Brunel's estimate appears in the following letter to Mr. Warburton:—

The Report, with Mr. Brunel's estimate, were sent to the Treasury on the 13th April, 1831: and having been approved by a Committee of practical engineers appointed by Government, the latter acted on the recommendations which it contained. The piece of ground adjoining Mr. Babbage's garden was taken, and a fire-proof building erected, designed to contain the plans and drawings, and also the engine when completed. But new and unforeseen difficulties arose. When about 17,000*l.* had been expended, further progress was arrested on account of a misunderstanding with Mr. Clement, who made the most extravagant demands as compensation for carrying on the construction of the engine in the new buildings. These demands could not be satisfied with proper regard to the justice due to Government. Mr. Clement accordingly withdrew from the undertaking, and carried with him all the valuable tools that had been used in the work; a proceeding the more unfortunate, as many of them had been in-

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"DEAR SIR, *Feb.* 28, 1831.

"HAVING taken into consideration the erection of the proposed shops, the removal of the machinery, the accommodation for it, and also for the maker; having also taken into consideration the further completion of the drawings, and the ultimate accomplishment of the Engine until it is capable of producing plates for printing; though I feel confident that the sum of 8000*l.* will be ample to realize the objects that are contemplated, I should nevertheless recommend that the Government be advised to provide for the sum of 12,000*l.* by way of estimate, and that the yearly sum required, exclusive of the sum requisite for the buildings and removal (say 2000*l*), will not exceed from 2000*l.* to 2500*l.*

"I am, &c.

"M. I. BRUNEL.

"*Henry Warburton, Esq.*"

vented expressly to meet the unusual forms and combinations arising out of the novel construction[16].

An offer was made to surrender the tools, for a given sum, which was declined, and the works came to a stand-still. But other circumstances interposed to prevent the completion of the original design.

During the suspension of the works, Mr. Babbage had been deprived of the use of his own drawings. Having in the meanwhile naturally speculated upon the general principles on which machinery for calculation might be constructed, *a principle of an entirely new kind* occurred to him, the power of which over the most complicated arithmetical operations seemed nearly unbounded. This was the executing of analytical operations by means of an analytical-engine. On re-examining his drawings, when returned to him by the engineer, the new principle appeared to be limited only by the extent of the mechanism it might require. The invention of simpler mechanical means for performing the elementary operations of the engine, now derived a far greater importance than it had hitherto possessed; and should such simplifications be discovered, it seemed difficult to anticipate, or even to over-estimate, the vast results which might be attained.

These new views acquired additional importance from their bearings upon the engine already partly executed for the Government; for, if such simplifications should be discovered, it might happen that the Analytical-Engine would execute with greater rapidity the calculations for which the Difference-Engine was intended; or that the Difference-Engine would itself be superseded by a far simpler mode of construction.

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[16] This Mr. Clement had a legal right to do. Startling as it may appear to the unprofessional reader, it is nevertheless the fact, that engineers and mechanics possess the right of property to all tools that they have constructed, although the cost of construction has been defrayed by their employers.

Though these views might perhaps at that period have appeared visionary, they have subsequently been completely realized. To have allowed the construction of the Difference-Engine to be resumed, while these new conceptions were withheld from the Government, would have been improper; yet the state of uncertainty in which those views were then necessarily involved, rendered any written communication respecting their probable bearing on that engine, a task of very great difficulty. It therefore appeared to Mr. Babbage, that the most straightforward course was to ask for an interview with the head of the Government, and to communicate to him the exact state of the case.

On the 26th September, 1834, Mr. Babbage requested an audience of Lord Melbourne, for the purpose of placing these views before him; his Lordship acceded to the request, but from some cause the interview was postponed; and soon after, the ministry went out of office, without the desired conference having taken place.

The duration of the Duke of Wellington's administration was short; and no decision on the subject of the *Difference*-Engine was obtained.

In May, 1835, Mr. Babbage announced in a letter[17] to M. Quetelet, which was laid before the Academy of Sciences at Brussels, that he had "for six months been engaged in making the drawings of a new calculating engine of *far greater power than the first.*" "I am myself astonished," says Mr. Babbage, "at the power I have been enabled to give to this machine; a year ago I should not have believed this result possible. This machine is intended to contain a hundred variables, or numbers susceptible of changing, and each of these numbers may consist of twenty-five figures. The greatest difficulties of the invention have already been surmounted, and the plans will be finished in a few months."

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[17] Mr. Babbage informs me, that this letter was intended only as a private communication.

Subsequently to the date of this letter, Mr. Babbage visited Turin, where he explained to Baron Plana, M. Menabrea, and several other distinguished philosophers of that city, the mathematical principles of his Analytical-Engine, and also the drawings and engravings of the more curious mechanical contrivances, by which those principles were to be carried into effect. M. Menabrea, with Mr. Babbage's consent, published the information which he had received in the 41st volume of the *Bibliothèque Universelle de Génève.* The article is remarkable as giving the first account of the Analytical-Engine[18]. An English translation, with copious original notes, made by a lady of distinguished rank and talent[19], was published in the third volume of Taylor's *Scientific Memoirs*.

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[18] In the *Ninth Bridgewater Treatise*, Mr. Babbage has employed various arguments deduced from the Analytical-Engine, which afford some idea of its powers. See second edition. In 1838, several copies of plans of this new engine, engraved on wood, were circulated amongst Mr. Babbage's friends at the Meeting of the British Association at Newcastle.

In 1840, Mr. Babbage had one of his general plans of the Analytical-Engine lithographed at Paris.

But it did not contain all the information respecting the Difference-Engine that was desirable, and Mr. Babbage was consequently led to communicate a short article upon this subject to the *Philosophical Magazine*, which is inserted in the 23rd volume[20]. The more comprehensive statements and official documents which Mr. Babbage has placed at my disposal renders it unnecessary to do more than allude to that article.

For nine years, that is, from the year 1833, when the construction of the Difference-Engine was suspended, until 1842, no decision respecting the machine was arrived at, although Mr. Babbage made several applications to Government on the subject.

On the 21st October, 1838, he wrote to the Chancellor of the Exchequer, stating that the question he wished to have settled was :—"Whether the Government required him to superintend the completion of the Difference-Engine, which had been suspended during the last five years, according to the original plan and principle, or whether they intended to discontinue it altogether." This letter produced no result. Time wore on, and Sir Robert Peel became Prime Minister. This was in 1841. Up to the termination of the Parliamentary Session in 1842, Mr. Babbage had received no other communication on the subject than a note from Sir George Clerk (Secretary to the Treasury), written in January of that year, stating that he feared the pressing official duties of Sir Robert Peel would prevent him turning his attention to the matter for some days.

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[19] I am authorized by Lord Lovelace to say, that the translator is Lady Lovelace.

[20] "The Difference-Engine could only tabulate, and was incapable by its nature of developing; the Analytical-Engine was intended to either tabulate or develope." The Difference-Engine is the embodying of one particular and very limited set of operations, the Analytical-Engine, the embodying of the science of operations. The distinctive characteristic of the Analytical-Engine, is the introduction into it of the principle which Jacquard devised for regulating by means of punched-cards the most complicated patterns in the fabrication of brocaded stuffs. Nothing of the sort exists in the Difference-Engine. We may say most aptly, that the Analytical-Engine weaves *Algebraical patterns*, just as the Jacquard loom weaves flowers and leaves!"—Note to translation of Menabrea's Memoir. The 59th volume of the *Edinburgh Review* contains an able and elaborate article upon the Difference-Engine, written by Dr. Lardner.

Having availed himself of several private channels for recalling the question to Sir Robert Peel's attention without effect, Mr. Babbage, on the 8th of October, 1842, again wrote to him, requesting an early decision.

At last Mr. Babbage received the following letter :—

"My dear Sir, "*Downing Street, Nov.* 3, 1842.

"The Solicitor-General has informed me that you are most anxious to have an early and decided answer as to the determination of the Government with respect to the completion of your Calculating Engine. I accordingly took the earliest opportunity of communicating with Sir R. Peel on the subject.

"We both regret the necessity of abandoning the completion of a Machine on which so much scientific ingenuity and labour have been bestowed. But on the other hand, the expense which would be necessary in order to render it either satisfactory to yourself, or generally useful, appears on the lowest calculation so far to exceed what we should be justified in incurring, that we consider ourselves as having no other alternative.

"We trust that by withdrawing all claim on the part of the Government to the Machine as at present constructed, and by placing it at your entire disposal, we may, to a degree, assist your future exertions in the cause of science.

"I am, &c.

"*Charles Babbage, Esq.* "HENRY GOULBURN.

"P.S. Sir R. Peel begs me to add, that as I have undertaken to express to you our joint opinion on this matter, he trusts you will excuse his not separately replying to the letter, which you addressed to him on the subject a short time since."

To this letter Mr. Babbage replied as follows:—

"*Dorset Street, Nov.* 6, 1842.

"MY DEAR SIR,

"I BEG to acknowledge the receipt of your letter of the 3rd of Nov., containing your own and Sir Robert Peel's decision respecting the Engine for calculating and printing mathematical tables by means of Differences, the construction of which has been suspended about eight years.

"You inform me that both regret the necessity of abandoning the completion of the Engine, but that not feeling justified in incurring the large expense which it may probably require, you have no other alternative.

"You also offer, on the part of Government, to withdraw all claim in the Machine as at present constructed, and to place it at my entire disposal, with the view of assisting my future exertions in the cause of science.

"The drawings and the parts of the Machine already executed are, as you are aware, the absolute property of Government, and I have no claim whatever to them.

"Whilst I thank you for the feeling which that offer manifests, I must, under all the circumstances, decline accepting it.

"I am, &c.

"C. BABBAGE."

Mr. Babbage had an interview with Sir R. Peel subsequently to the date of the foregoing letter: the result was, however, entirely unsatisfactory; and thus, with the communication from the then Chancellor of the Exchequer, terminated an engagement which had existed upwards of twenty years, during which period it is due to Mr. Babbage to state, that he refused more than one highly desirable and profitable situation[21], in order that he might give his whole time and thoughts to the fulfilment of the contract, which he considered himself to have entered into with the Government.

With respect to the Difference-Engine little remains to be added. In 1843, an application was made to Government, by the Trustees of King's College, London, to allow the Engine, as it existed, to be removed to the museum of that institution. The request was complied with; and the Engine, enclosed within a glass case, now stands nearly in the center of the Museum. It is capable of calculating to five figures, and two orders of differences, and performs the work with absolute precision; but no portion whatever of printing machinery, which was one of the great objects in the construction of the Engine, exists. All the drawings of the machinery and other contrivances are also in King's College.

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[21] Mr. Babbage has shown me letters by which it appears that he declined offices of great emolument, the acceptance of which would have interfered with his labours upon the Difference-Engine.

Before closing this Chapter, it will not be out of place to put upon record the state of the Analytical-Engine at this period (1848).

Mechanical Notations have been made, both of the actions of detached parts, and of the general action of the whole, which cover about four or five hundred large folio sheets of paper.

The original rough sketches are contained in about five volumes. There are upwards of one hundred large drawings. No part of the construction of the Analytical-Engine has yet been commenced. A long series of experiments have, however, been made upon the art of shaping metals; and the tools to be employed for that purpose have been discussed, and many drawings of them prepared. The great object of these inquiries and experiments is, on the one hand, by simplifying the construction as much as possible, and on the other, by contriving new and cheaper means of execution, ultimately to reduce the expense within those limits which a private individual may command.

CHAPTER XII.

Harris's Lightning-Conductors—The Admiralty request the Society's Opinion—Revision of Statutes—Committee for the Improvement of Glass—Letter from Dr. Faraday—Inquiry into the State of Gas-Works—Letter from Sir Robert Peel—Foundation of Royal Medals—First Award of Medals—Duke of Sussex's Explanation—Resolutions of Council respecting the Medals—North Polar Expedition—Letter from Sir E. Parry—Declining Health of Sir Humphry Davy—Letter from him—Resigns the Presidency—Thanks of the Society voted to him—Mr. Davies Gilbert elected President.

1820—30.

IN May, 1823, the Admiralty requested the opinion of the Society on the lightning-conductors for vessels of war, invented by Mr. (now Sir William) Snow Harris[1], a surgeon at that time residing in Plymouth. The invention consisted in inserting conductors, formed of slips of copper of sufficient thickness to prevent them from being fused, in two layers in a groove cut longitudinally along the mast, and fastened to it by copper screws. The whole line of metal passes down from the copper spindle at the top of the mast-head, to the water, by which a communication is formed by means of copper bolts driven through the keel[2].

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[1] He was knighted in 1847 for this invention.

[2] In 1762, Dr. Watson recommended in a letter to Lord Anson, (then First Lord of the Admiralty), published in the 52nd volume of the *Philosophical Transactions*, that His Majesty's navy should be supplied with lightning-conductors, to be constructed of long links of copper rod, about one-fourth of an inch in diameter, united by small eyes, the whole being attached to a hempen line applied from the mast-head to the sea. One conductor of this kind was, in

Mr. Harris communicated his plan to Sir Thomas Byam Martin, Comptroller of the Navy, in a letter, which he concludes by saying, that his "conductor is permanently fixed throughout its whole extent, is perfectly continuous from the keel to the mast-head; and admits not only of every possible motion of one portion of the mast upon another, but of any part of the mast being removed either by accident or design, without having its continuity interrupted for an instant."

But the Comptroller and his colleagues were naturally desirous to have the highest scientific opinion upon the merits of the conductors. In their communication to the Council of the Society, they say:—

"The most important matter for us to ascertain is, whether among persons best versed in the subject of electric discharges, there appears to be any objection to the application of fixed conductors of this description; and if not, whether the dimensions of the copper may be considered as sufficient to carry off the greatest quantity of electric matter to which ships are ever likely to be exposed.

"The importance of this object regarding alike the preservation of ships and the lives of men, will, we are confident, be a sufficient apology for submitting it to you."

The Council lost no time in complying with the request of the Admiralty. A Committee was ap-

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consequence of this suggestion, supplied to each of His Majesty's ships: it was packed in a box, and directed to be triced up by the signal halliards when occasion required. It is manifest that these conductors were open to serious objections.

pointed, presided over by Sir Humphry Davy, who, after examining the conductors, reported in their favour. It is gratifying to find that so eminently useful an invention was appreciated by the Royal Society, for their Report urged the adoption of Sir W. S. Harris's conductors. The new invention was not, however, immediately used. Several statements were made in disparagement of the conductors, and it was not until a Committee, appointed in 1839 by the Admiralty, reported, upon the evidence of men of science, including Professors Faraday and Wheatstone, that "all the objections which have been brought against them, have, to our minds, been sufficiently removed," that the use of the conductors became at all general. Now, Mr. Barrow of the Admiralty informs me, "Harris's conductors are generally used in the Navy[3], and the contract steam-packets employed under the Admiralty are also fitted with them[4]."

In 1823, a Committee was appointed to revise the Statutes, which had remained unaltered since 1776, although many unavoidable and highly salutary changes in the constitution of the Society had been made. In the former century, the Society's apart-

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[3] It appears by an official Admiralty Report, that the expense of these conductors is as follows :—

	£.
Ship of 120 Guns	258
„ 84 „	246
„ 74 „	230
„ 50 „	214

[4] The reader who may be desirous of further information on this subject, is referred to an interesting work by Sir W. S. Harris, entitled :—*Remarkable Instances of the Protection of certain Ships of H. M. Navy from Lightning.* 8vo. London, 1847.

ments were in Crane Court, and included a Museum, a Repository, and an apparatus-room, for the regulation of which particular Statutes were framed. As these no longer existed, the laws relating to them were repealed.

The annual contributions from Members had not been increased since the year 1660, notwithstanding the great diminution in the value of money. They were now raised from a shilling a week to four pounds a-year; and at the same time, the admission fee was raised from five guineas to ten pounds, and the sum to be paid as composition of annual contributions from twenty-six guineas to forty pounds[5]. Another very important alteration consisted in limiting the number of Foreign Members to 50, and so conducting the manner of their election, that none but persons of high scientific distinction should be admitted to the honour. This was effected by the Council nominating the candidates, and the opinion of each Member being taken by ballot, before the approved candidate was brought before the Society for ultimate election. The title of Clerk was abolished, and that of Assistant-Secretary created in its place. The duties devolving on this functionary comprise all those belonging to the Clerk; but as this officer is strictly speaking the assistant or agent of the Council, and particularly of the Treasurer and Secretaries, it was judged expedient that the name should be changed to Assistant-Secretary; and that his appointment should rest with the President and Council, to whom he is immediately responsible.

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[5] This was increased in 1840, to 60*l.*, at which it still remains. Persons, however, contributing a paper to the *Philosophical Transactions,* were permitted, on being elected, to compound for 40*l.* This rule continues in force.

Greater facilities were allowed for the use of the Library. It was ordered to be opened three days in the week during the session of the Society, instead of two as before[6], and Fellows were permitted to take out books without the formality of a motion in the Society. A new Catalogue of the books was also printed.

The philosophical deficiencies attendant on the manufacture of glass for scientific optical purposes, induced the Council to appoint a Committee on the 6th May, 1824, "for the improvement of glass for optical purposes." The Committee was composed of Sir Humphry Davy, Mr. Combe, Mr. Brande, Mr. Dollond, Mr. Gilbert, Mr. Hatchett, Mr. (now Sir James) South, Dr. Wollaston, Mr. Warburton, and Dr. Young. In the *Philosophical Transactions* for 1830, there is a Paper by Dr. Faraday, "On the Manufacture of Glass for optical purposes," in which he gives some account of the labours of the Committee. He says:—

> "The Government not only removed the restrictions to experiments on Glass occasioned by the Excise laws and regulations, but undertook to bear all the expenses of furnaces, materials, and labour, as long as the investigations offered a reasonable hope of success. In consequence of these facilities, a small glass-furnace was erected, and many experiments, both on a large and small scale, were made with flint and other glass. During

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[6] It is now open every day during the year, with the exception of Sundays, Good Friday, Easter, Whitsun, and Christmas weeks, and the month of August.

their continuance, Messrs. Green and Pellatt (glass-manufacturers) gave every instruction and assistance in their power, and evinced the most earnest desire for success. The researches, however, soon showed themselves to be a work of labour, which, to be successful, would require to be pursued unremittingly for a long period; and on May 5, 1825, a Sub-committee was appointed, to whom the direct superintendence and performance of experiments were entrusted. This Committee consisted of Mr. Herschel, Mr. Dollond, and myself; but in March 1829, was reduced to two, by the retirement of Mr. Herschel, who about that period went to the continent. From the respective pursuits of the three persons appointed on this Committee, it may be easily gathered that though all were to do what they could in every way for the general good of the cause in which they were jointly engaged, yet a distinction in the duties of each existed. It was my business to investigate particularly the chemical part of the inquiry, Mr. Dollond was to work and try the glass, and ascertain practically its good or bad qualities; whilst Mr. Herschel was to examine its physical properties, reason respecting their influence and utility, and make his competent mind bear upon every part of the inquiry.

"The experimental glass-house was erected on a part of the premises of Messrs. Green and Pellatt, at the Falcon Glass-Works; whilst my duties as Director of the Laboratory of the Royal Institution required my presence almost constantly at the latter place, nearly three miles from the former. As I found it impossible, under these circumstances, to make the numerous experiments, and pay that close attention which appeared essentially necessary to produce any degree of success, the President and Council of the Royal Society applied to the President and Managers of the Royal Institution, for leave to erect on their premises an experimental room, with a furnace, for the purpose of continuing the investigation. They were guided in this by the desire which the Royal Institution has always evinced to assist in the advancement of science; and the readiness with which the application was granted, showed that no mistaken notion had been formed in this respect. A room and furnaces were built in September 1827, and an assistant engaged. At first the inquiry was pursued principally as related to flint and crown-glass; but in September 1828, it was directed exclusively to the preparation and perfection of peculiar heavy and fusible glasses; from which time to the present continual progress has been made[7]."

This was written in 1830. It appears by the Reports of the Committee, that they were enabled at that period to manufacture glass of a superior quality for optical purposes. They say:—"The telescope made with Mr. Faraday's glass has been examined by Captain Kater and Mr. Pond. It bears as great a power as can reasonably be expected, and is very achromatic. The Committee therefore recommend that Mr. Faraday be requested to make a perfect piece of glass of the largest size that his present apparatus will admit, and also to teach some person to manufacture the glass for general sale."

But the valuable time of Dr. Faraday had been so long occupied in experiments relating to this investigation, that he declined acceding to the recommendation of the Committee. His answer appears in the following letter to Dr. Roget:—

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[7] Pp. 2, 3.

"Dear Sir, "*Royal Institution, July* 4, 1831.

"I send you herewith four large, and two small manuscript volumes, relating to optical glass, and comprising the Journal-book and Sub-committee-book, since the period that experimental investigations commenced at the Royal Institution.

"With reference to the request which the Council of the Royal Society have done me the honour of making, namely, that I should continue the investigation; I should, under circumstances of perfect freedom, assent to it at once. But obliged as I have been to devote the whole of my spare time to the experiments already described, and consequently to resign the pursuit of such philosophical enquiries as suggested themselves to my own mind, I would wish, under present circumstances, to lay the glass aside for awhile, that I may enjoy the pleasure of working out my own thoughts on other subjects.

"If at a future time the investigation should be renewed, I must beg it to be clearly understood I cannot promise full success should I resume it: all that industry and my abilities can effect shall be done; but to perfect a manufacture not being a manufacturer, is what I am not bold enough to promise.

"I am, &c.

"*Dr. Roget, Sec. R.S.*" "M. Faraday.

Dr. Faraday was not satisfied with the results of his experiments. In a letter which he was so kind as to write to me upon this subject, he says: "I consider our results as negative, except as regards any good that may have resulted from my heavy glass in the hands of Amici (who applied it to microscopes), and in my late experiments on light." Dr. Faraday here alludes to his discovery of the action of magnetism upon light, which he communicated to the Royal Society in November, 1845. He says: "Sixteen years ago I published certain experiments made upon optical glass, and described the formation and general characters of one variety of heavy glass, which, from its materials, was called silicated borate of lead. It was this glass which first gave me the discovery of the relation between light and magnetism, and it has power to illustrate it in a degree beyond that of any other body[8]."

The reader will remember that in 1814, Government requested the Society to examine certain gas-works in the metropolis, with the view of ascertaining whether they were efficiently constructed. In 1825, a letter was received from Sir Robert Peel, on the part of Government, praying the Council to report "whether the operations of the gas-companies are now carried on upon such principles as would admit, with a due attention to the public safety, of the supervision and control with which the Secretary of State is invested by the provisions of the Legislature, being withdrawn[9]."

As usual, this application met with the promptest attention. A Committee of the most eminent scientific men was appointed. The gas-works were minutely examined, and a Report was drawn up to the effect, that "there was a great necessity for the improvement of some of the works, and a propriety of occasional superintendence of all of them."

In 1825, the Society received a very high mark of

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[8] *Philosophical Transactions*, 1846, p. 3.

[9] Archives: Royal Society.

Royal favour, the nature of which will appear by the subjoined letter:—

"Sir, "*Whitehall, Dec.* 3, 1825.

"I am commanded by the King to acquaint you, that His Majesty proposes to found two Gold Medals of the value of Fifty Guineas each, to be awarded as honorary premiums under the direction of the President and Council of the Royal Society, in such manner as shall, by the excitement of competition among men of science, seem best calculated to promote the objects for which the Royal Society was instituted.

"His Majesty desires to receive from the President and Council of the Royal Society their opinion upon the subject generally of the regulations which it may be expedient to establish with regard to the appropriation of the Medals, and I have therefore to request that you will make the necessary communication to the Council of the Royal Society, in order that His Majesty's wishes may be carried into effect.

"I have the honour to be &c.

"Robert Peel.

"*Sir Humphry Davy, Bart., P.R.S.,*
&c. &c. &c."

The Council forthwith "Resolved, that the offer contained in this letter be most gratefully accepted, and that the humble and dutiful thanks of the President and Council be respectfully returned to his Majesty for this instance of his munificence, and of his disposition to promote the objects of the Royal Society, and the general interests of science." The President, in accordance with the foregoing Resolution, addressed a letter to Sir Robert Peel, and added, that the earliest opportunity would be taken to consider the arrangement which it would be desirable to adopt with reference to the foundation of the medals.

At the ensuing Council, which met on the 26th January, 1826, the following Resolutions were agreed to:—

"That it is the opinion of the Council, that the Medals be awarded for the most important discoveries, or series of investigations, completed and made known to the Royal Society in the year preceding the day of their award.

"That it is the opinion of the Council, that the presentation of the Medals should not be limited to British Subjects, and they propose, if it should be His Majesty's pleasure, that his effigy should form the obverse of the Medal.

"That two Medals from the same die should be struck upon each foundation, one in gold, and one in silver."

These Resolutions were approved by the King, and preparations were made to strike two medals, to be ready for awarding in 1826.

In that year, two eminent men of science were selected by the President and Council to receive the Medals; but, unfortunately, from causes which will be explained presently, no medals were forthcoming.

Sir H. Davy, in his Anniversary Address, thus alludes to the Royal Medals:—

"This foundation was announced in the true spirit of royal munificence, so it has been completed with an exalted liberality worthy of our august Patron. The two prizes are established in the forms of silver and gold Medals, to be given for important discoveries or useful labours in any department of science, and they are laid open to learned and ingenious men of all countries, without any principle of narrow policy or national exclusion.

"In the first award of these Royal Medals, your Council have had some difficulties in their decision. Discoveries are sometimes made of great interest, which require time and new labours for their confirmation; and when their importance is great and their bearings extensive, years even may pass away before a full conviction of their truth can be obtained. Now, though within the year just past there have been more than one important discovery announced to the world, yet there are none which can be said to be as yet fairly and securely established.

"Your Council, therefore, have rather looked to labours which have been sanctioned by time, the importance of which is generally felt, though not sufficiently acknowledged; which may be said to have acquired their full authority only within a very short period, and which, consequently, may be considered as within the literal meaning of the foundation.

"They have awarded the first prize to Mr. John Dalton, of Manchester, Fellow of this Society, for the development of the Chemical Theory of definite proportions, usually called the Atomic theory, and for his various other labours and discoveries, in physical and chemical science; and they have awarded the second Medal to James Ivory, for his Papers; 'On the Laws regulating the Forms of the Planets;' 'On Astronomical Refractions;' and, 'On other Mathematical Illustrations of important parts of Astronomy[10].'"

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[10] Journal-book, Vol. XLIII.

Sir Humphry Davy must have regretted that the Medals were not ready for delivery. He does not, however, mention their absence in his Address; indeed, the reader would probably arrive at the conclusion, that the substance as well as the spirit of the honour passed to the gentlemen selected by the Council to receive the prizes.

Fortunately, I am enabled to assign the exact reasons which led to the delay in completing the Medals, as H.R.H. the Duke of Sussex, when President, felt himself called on to account to the Society for the non-carrying out of the intentions of George the Fourth.

In H.R.H. Address from the Chair on the 30th November, 1833, he says: "It must be well known to you, Gentlemen, that the Royal Medals were not adjudged during the two first years that I presided over the Royal Society, and as there exist many circumstances connected with the original grant and distribution of those Medals, I trust I may be allowed to enter into some details respecting them." His Royal Highness then gives an account of their original foundation, and afterwards proceeds as follows:—

"Mr. Chantrey, to whom, in conjunction with Sir Thomas Lawrence, was intrusted the selection of the subject for the Medal, furnished the cast for the medallion of the head of His late Majesty, which was to form the obverse of it[11], while Sir Thomas undertook to compose the design for the reverse. Unfortunately, that distinguished artist, either from over-delicacy or over-anxiety to produce a work of art worthy of the object for which it was intended, or from that spirit of procrastination which was unhappily too common with him, delayed its execution from year to year, and died without leaving behind him even a sketch of his ideas respecting it, though the character of such a design as would be at once classical and appropriate to the purpose, was the subject of frequent conversation, and even of favourite speculation with him. From these and other causes, to which it is not necessary for me now to advert, it arose, that, at the demise of His late Majesty, although the adjudication of ten Medals had been formally announced from the Chair of the Royal Society, not even the dies, much less the Medals, were forthcoming for the purpose of distribution to the various distinguished persons, some of them foreigners, to whom they had been awarded.

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[11] Sir F. Chantrey submitted his design to the Council on the 26th February. He intended it as a present to the Society.

"It cannot be necessary for me to impress upon you, Gentlemen, that the non-completion of an engagement so solemnly entered into with the whole republic of men of science, would have brought discredit not merely upon the Royal Society, but upon the personal honour of a Monarch of this country, whose name it is our especial duty, as Fellows of the Royal Society, to hand down unsullied to posterity, as our munificent Patron and benefactor; and as no funds had been placed at the disposal of our Treasurer, nor in the hands of any other ostensible person to meet the very heavy expenses which must be incurred for cutting the dies and furnishing the Medals already awarded, I felt it to be my duty, when I succeeded to this Chair, to recommend to the Council the suspension of any further adjudgment of the Medals until I could have an opportunity of ascertaining the nature of the commands which had been issued concerning them by the late Sovereign through his official advisers or otherwise, and also of taking the pleasure of His present Majesty respecting their continuance in future, and the conditions to which they should be subject. These inquiries terminated in the most satisfactory manner. On a proper application to those who were intrusted with the ultimate arrangement of His late Majesty's affairs, prompt measures, as far as lay in their power, were adopted for the immediate fulfilment of every pledge which it was conceived had been given to the Royal Society and to the public at large in the name of George the Fourth.

"The dies for the Medals upon the old foundation are now completed, and ready for distribution[12]; they bear upon the one side the likeness of His late Majesty, while the reverse represents the celebrated Statue of Sir Isaac Newton, which is placed in the Chapel of Trinity College, Cambridge, with such emblematical accompaniments as seemed best calculated to indicate the magnificent objects of the researches and discoveries of that great philosopher, whose peculiar connexion with the Royal Society forms the most glorious circumstance in its annals.

"It will be my first duty, Gentlemen, to distribute the Ten Royal Medals which have been already adjudged during the lifetime of His late Majesty, to Philosophers who are amongst the most illustrious in this country or in Europe: they form a glorious commencement of a philosophical chivalry, under whose banners the greatest amongst us might feel proud to be enrolled[13]; and though it may appear presumptuous in me to hope that a constant succession of associates can be found, either at home or abroad, who shall be considered worthy of being ranked with those noble Founders of this Order, yet I am confident that the Council of the Royal Society will feel an honourable pride in maintaining the character of the Body whose Members are to be constituted by their choice."

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[12] They were executed by Mr. Wyon, of the Royal Mint.

[13] The third Medal was awarded to Sir H. Davy, who did not, however, live to receive it.

The foregoing quotation renders it evident, that the delay in executing the Medals did not arise from any neglect on the part of the Royal Society. Though anticipating events, it will not be entirely out of place to give here an account of the proceedings connected with the Royal Medals, subsequently to their foundation.

Shortly after 1825, it was found that the limited time fixed upon for the distribution of the prizes, was very inconvenient; consequently, the resolution of the 26th January, 1826, was rescinded, and the following substituted:—

"The Royal Medals shall in future be respectively awarded on the day of the Anniversary Meeting in each year, for the most important discoveries, or series of investigations, on any one principal subject, or branch of knowledge which shall have been sufficiently established or otherwise completed to the satisfaction of the Council within five years preceding the day of such award, and for which a Royal Medal shall not have been already bestowed."

Under these regulations, the awards continued to be made until the decease of George IV. On the 25th March, 1833, nearly three years after the accession of William IV. to the throne, a communication was received by the Society through the Duke of

Sussex, stating that it was his Majesty's intention to restore the foundation of the Royal Medals, under these regulations:—

"First. That the two gold Medals of the value of Fifty Guineas each, shall henceforth be awarded on the day of the Anniversary Meeting of the Royal Society, on each ensuing year, for the most important discoveries in any one principal subject or branch of knowledge.

"Secondly. That the subject matter of inquiry shall be previously settled and propounded by the Council, three years preceding the day of such award.

"Thirdly. That literary men of all nations shall be invited to afford the aid of their talents and research: and

"Fourthly. That for the ensuing three successive years, the said two Medals shall be awarded to such important discoveries, or series of investigations, as shall be sufficiently established, or completed to the satisfaction of the Council, within the last five years of the days of award, for the years 1834 and 1835, including the present year, and for which the Author shall not have previously received an honorary reward."

In compliance with the foregoing terms, the Council, at a Meeting held on the 28th March, 1833, Resolved:—

"That the following be the order of subjects to which Royal Medals shall be awarded:—viz.

1. Astronomy.
2. Physiology.
3. Geology and Mineralogy.
4. Physics.
5. Mathematics.
6. Chemistry."

Committees were appointed to propose "*Prize Questions*," but this course not answering expectation, the Council ultimately resolved to award the Royal Medals to the authors of the most important unpublished Papers in the sciences, of which notice was given[14], communicated to the Society for insertion in their *Transactions*, within three years from the date of the notice inserted at the commencement of each volume of the *Transactions*. Under these regulations, two Royal Medals were awarded annually during the reign of William IV.

Her Majesty Queen Victoria was graciously pleased, upon ascending the throne, to become the Patron of the Society, as her predecessor was, and at the same time, announced her intention to continue the grant of two Royal Medals annually, under the annexed Resolutions, proposed by the Council, and approved by her Majesty:—

"That the Royal Medals be given for such Papers *only* as have been presented to the Royal Society, and inserted in their *Transactions*.

"That the triennial cycle of subjects be:—

1. ASTRONOMY; PHYSIOLOGY, including the Natural History of Organized Beings.
2. PHYSICS; GEOLOGY, or MINERALOGY.
3. MATHEMATICS; CHEMISTRY.

"That, in case no Paper coming within these stipulations should be considered deserving of the Royal Medal, in any given year, the Council have the power of awarding such Medal to the Author of any other Paper on either of the several subjects forming the Cycle, that may have been presented to the Society and inserted in their *Transactions;* preference being given to the subjects of the year immediately preceding: the award being, in such case, subject to the approbation of Her Majesty[15]."

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[14] The triennial cycle of subjects was, Astronomy and Physiology; Geology and Physics; Mathematics and Chemistry.

The dies for the present Medal were executed by Mr. Wyon. Dr. Whewell informs me it was at his recommendation that Mr. Wyon inserted the two diagrams on the Medal which appear on either side of the statue of Newton. That on the right is taken from the sixty-sixth Proposition of the *Principia*, embodying the first idea of perturbating forces:—the other represents the solar system. A duplicate Medal in silver is always given with that in gold.

In 1826, the attention of the Council was again called to the subject of North Polar Expeditions, by a letter from Captain Parry to Sir John Barrow, which was communicated to the Council for their opinion. Captain Parry proposed a plan to attempt to reach the North Pole by means of travelling with sledge-boats over the ice, or through any spaces of water that might occur[16]. In his letter he says: "Should little or no land be discovered, the state of the sea with respect to ice, both as to thickness and extent in

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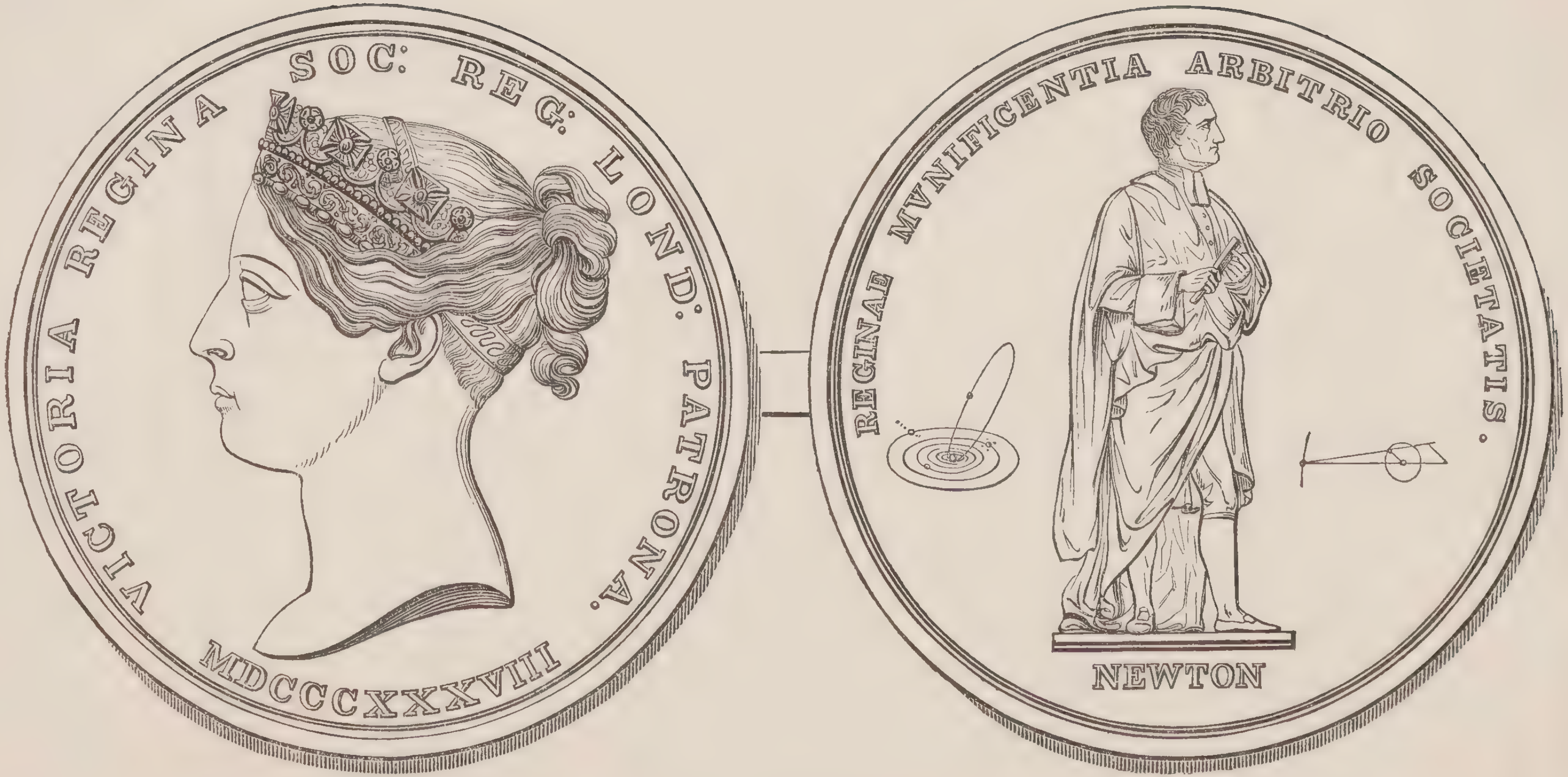
[15] It is always customary for the President to apprise the Queen of the proposed award by the Council; and on Her Majesty approving the award, orders are issued by her officers to strike the Medals.

[16] Captain Parry states, that this plan originated from Captain Franklin. I have perused a most interesting document by Sir John Franklin detailing his views on this subject: but it is due to Captain Scoresby to record, that he was the first to propose the use of sledges in Arctic Expeditions.


VICTORIA REGINA SOC: REG: LOND: PATRONA.
MDCCCXXXVIII
REGINAE MVNIFICENTIA ARBITRIO SOCIETATIS.
NEWTON

Royal Medal.

the highest latitudes, would be an object of considerable curiosity. If *no* open water be met with, it would be interesting to ascertain by marks left in going outward, and by observations on the same spots on the return, whether the ice has any motion at all during the summer months, thus determining whether the circumpolar ice forms a nucleus perpetually fixed, or the contrary. The degree of diminution in the ice by dissolution in the higher latitudes, during a given interval in the melting season, might thus also be ascertained. The depth of the sea near the Pole, would be an interesting object of enquiry in connexion with the suggestion of the President of the Royal Society, that if it be found very deep, it would in all probability not be frozen." The letter (which is of great interest) then proceeds to recount the probable advantages to be derived from the expedition, and concludes by urging the British Government to use every means "to cause the English flag to be the first to wave over the most remote and hitherto inaccessible portions of the globe, from the Equator to either Pole." The Council approved the plan proposed by Captain Parry, and requested Sir Humphry Davy to write to Lord Melville (First Lord of the Admiralty), expressing their approbation and opinion that the enterprize, if successful, could not fail to afford several valuable scientific results, and to settle many important matters of scientific inquiry. In consequence of this communication Lord Melville decided on assenting to Captain Parry's expedition. His Lordship writing to the President says :—

"The Council, having no doubt, balanced all the difficulties against the probable advantages, and having declared in favour of the Expedition, I do not feel myself at liberty to withhold my assent to Captain Parry's earnest request, confirmed and sanctioned by the authority of the respectable body whose wishes you have conveyed to me, and I have given directions accordingly for the necessary preparations to be made for carrying the measure into effect[17]."

When it is remembered that Captain Parry since 1818 had made four voyages into the Arctic seas, and passed four winters in the ice, we cannot do otherwise than regard him with feelings of high admiration, when we find him offering himself for an enterprise full of novelty, difficulty, and danger; for such it turned out to be. Two boats were constructed, 20 feet long and 7 feet broad, flat-floored, and built as strong as wood and iron could make them. These were taken out in the *Hecla*, which sailed with the party on the 4th April, 1827. They reached Spitzbergen on the 18th of June, and, according to instructions, left the *Hecla* there, under the command of Lieutenant Foster. Captain Parry and Lieutenant (now Captain Sir James) Ross, with twenty men, started in the boats, steering due north. The next day they came to the ice, upon which they hauled the boats. Instead, however, of finding it a smooth level plain, as they expected, it consisted entirely of small loose rugged masses, presenting fearful difficulties for the transit of the boats. After toiling in the most laborious manner for 35 days, they attained the latitude of 82°. 45, and were 172 miles from the *Hecla*. "But as," says Captain Parry, "we travelled by far the greater part of our distance on the ice, three, and not unfrequently five times over, we may safely multiply the length of the road by two and a half; so that our whole distance, on a very moderate calculation, amounted to 668 miles, being nearly sufficient to have reached the Pole in a direct line. With great aptness may the lines of Coleridge be applied to the gallant party in this expedition:—

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[17] In a letter to the Council, Captain Parry says, "that the liberal and enlightened views of the Council mainly led to the adoption of the enterprise by the Admiralty."

"The ice was here, the ice was there,
The ice was all around:
It cracked and growled, and roared and howled
Like noises in a swound."

On the 21st of August, they arrived on board the *Hecla*, after an absence of sixty-one days, thus ending a most perilous expedition, of which, "though the object was not accomplished, every officer and man employed in it may be proud[18]." Many valuable and interesting magnetical observations were made, and communicated to the *Philosophical Transactions*.

As already noticed, Sir Humphry Davy's declining health rendered him exceedingly unfit for the arduous duties connected with the office of President. But though very unwell, his attendance at the Royal Society suffered little interruption. In 1825, he was only absent four times; and in 1826, when his health was worse, only three times from the ordinary Meetings. His bodily sufferings were so acute, as to render him almost unable to deliver his Anniversary Address in the latter year, yet he presided at the two subsequent ordinary Meetings of the Society, in the month of December. The last time that he occupied the Chair, was on the 21st of that month. In the following January he left England. His friend, Mr. Davies Gilbert, Treasurer and Vice-President, presided at the Council and ordinary Meetings during his absence; which from the first there was, unfortunately, too much reason to suppose would be prolonged, if not permanent. On the 1st July, 1827, Sir Humphry Davy addressed a letter to Mr. Gilbert from Salzburg, in which, after detailing the very unsatisfactory state of his health, he adds:—

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[18] Barrow's *History of Arctic Voyages*, Vol. II. p. 308.

"Under these circumstances I feel it would be highly imprudent, and perhaps fatal for me, to return, and to attempt to perform the official duties of President of the Royal Society. And as I had no other feeling for that high and honourable situation, except the hope of being useful to society, so I would not keep it a moment without the security of being able to devote myself to the labour and attention it demands. I beg therefore you will be so good as to communicate my resignation to the Council, and to the Society at their first meeting in November, after the long vacation; stating the circumstances of my long and severe illness, as the cause. At the same time, I beg you will express to them how truly grateful I feel for the high honour they have done me, in placing me in the Chair for so many successive years. Assure them that I shall always take the same interest in the progress of the grand objects of the Society, and throughout my whole life endeavour to contribute to their advancement, and to the prosperity of the body.

"Should circumstances prevent me from sending, or you from receiving any other communication from me before the autumn (for nothing is more uncertain than the post in Austria, as they take time to read the letters), I hope this, which I shall go to Bavaria to send, will reach you safe, and will be sufficient to settle the affair of resignation.

"It was my intention to have said nothing on the subject of my successor. I will support by all the means in my power the person that the leading members of the Society shall place in the Chair; but I cannot resist an expression of satisfaction in the hope you held out, that an illustrious friend of the Society, illustrious from his talents, his former situation, and I may say, his late conduct, is likely to be my successor.

"I wish my name to be in the next Council, as I shall certainly return, *Deo volente,* before the end of the session, and I may, I think, be of use, and likewise because I hope it may be clearly understood that my feelings for the Society are, as they always were, those of warm attachment and respect. Writing still makes my head ache, and raises my pulse. I will therefore conclude, my dear Sir, in returning you my sincere thanks for the trouble you have had on my account, and assuring you that I am

"Your obliged and grateful friend and Servant,

"HUMPHRY DAVY.

"*Davies Gilbert, Esq., M.P., V.P.R.S.*"

In accordance with the foregoing letter, Mr. Gilbert communicated Sir Humphry Davy's resignation to the Council, at their first Meeting after the vacation. This was on the 6th November, 1827. The following resolution was drawn up, and ordered to be submitted to the Society at the ensuing ordinary Meeting: "That the regret of the Fellows of the Royal Society be expressed in the strongest terms to their late excellent President, Sir Humphry Davy, Bart., for the state of health which has unhappily compelled him to relinquish the Chair, together with their thanks for the unremitting diligence with which he has at all times endeavoured to promote the interests of science, and the welfare of the Royal Society, and for the learned and eloquent Discourses with which, on each Anniversary during his Presidency, he concluded the business of the year." It is scarcely necessary to say, that this resolution was "unanimously agreed to."

The resignation of Sir Humphry Davy occurring before the Anniversary, threw the election of a President until that period upon the Council. The Minutes state that "Mr. Davies Gilbert was unanimously elected President *pro tempore*, and took the oaths accordingly." His election was confirmed by the Society at the Anniversary Meeting on the 30th November, 1827. Sir Humphry Davy at that period had returned to England, but his infirmities were such as to render repose and freedom from care and anxiety more than ever necessary.

CHAPTER XIII.

Memoir of Davies Gilbert—The Society obtain additional Accommodation in Somerset House—Royal Medal awarded to Davy—Colonel Sabine's Papers on Terrestrial Magnetism—Their importance—Halley's Variation Chart—Dip of the Needle—Magnetism of the Earth investigated by several Philosophers—Humboldt proposes the Establishment of Magnetical Observatories—His Letter to the Duke of Sussex—Royal Society memorialize Government to establish Observatories—Report of Committee of Physics—East India Company found Observatories—Activity of these Institutions—Invention of Self-registering Magnetometers—Donation Fund—Letter from Dr. Wollaston—Presents a large quantity of Platinum and Palladium to the Society—Sale of Arundel Manuscripts—Bridgewater Treatises—Committee of Meteorology—Water Barometer—Description of it—Death of George IV.—The Society address William IV.—The King becomes Patron of the Society—Davies Gilbert resigns—The Duke of Sussex elected President.

1825—30.

DAVIES GILBERT[1] was born on the 6th March, 1767, at Tredrea, in the parish of St. Erth, in the west of Cornwall. His paternal name was Giddy, his father being the Rev. Edward Giddy, of St. Erth. His mother was Catherine Davies, allied to the noble family of Sandys, and a descendant of William Noye, Attorney-General in the reign of Charles the First. She was an heiress of very considerable property. Young Giddy was reared with great care and attention, as a child of promise, but not of robust health. His early education, which was almost entirely domestic, was chiefly superintended by his father, who was an accomplished classical scholar, and a man of acknowledged ability and attainments. His pupil's tastes soon led him to prefer the study of the severer sciences to the elegancies of classical literature, and these studies were pursued with an ardour not to be repressed. As he grew up, it was thought desirable to place him in the grammar-school of Penzance; and for this purpose, his parents removed for about eighteen months to that town. In 1782, they went to Bristol, where their son's studies were assisted for some time by Mr. Benjamin Donne. In 1785, young Gilbert matriculated at Oxford, becoming a gentleman-commoner of Pembroke College. He had already made himself master of considerable mathematical and physical knowledge, and had acquired the greater portion of it by almost unassisted application. His efforts had been guided and aided by the Rev. Malachy Hitchins (whose connexion with the late Dr. Maskelyne and the *Nautical Almanack* is well known), from whom he obtained, as he has himself recorded, "information in those sciences which afforded him uninterrupted entertainment and delight throughout the whole continuance of a protracted life." It is not surprising, therefore, to find that he associated with the senior members of his College, preferring their company to that of students of his own age. Dr. Parr, writing at this time to the late master of Pembroke, speaks of Mr. Giddy, then twenty-three years old, as "the Cornish philosopher;" and adds, "he deserves that name." During his residence at Oxford, Mr. Gilbert was a regular attendant at the lectures on anatomy and mineralogy delivered by Dr. Thomson at Christ Church. He also attended with assiduity the lectures on chemistry and botany, of Drs. Beddoes and Sibthorp, and contracted a friendship with those gentlemen, which terminated only with their lives. He also attended Mr. Hornsby's lectures on geometry and astronomy, and devoted himself with great diligence to the study of mathematics and the natural sciences. "He used to boast with very becoming pride, that he was the first student of his class in the University of Oxford, who had ever read the *Principia* of Newton[2]." He took the honorary degree of M.A., and continued to reside principally in his College until 1793, when he returned to Cornwall, to serve as sheriff. His time appears to have been principally divided between the cultivation of science and literature, and the duties of a magistrate in a populous and busy town.

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[1] Dr. Paris, the well known friend of Mr. Gilbert, has been so kind as to give this memoir the benefit of his revision.

He had in very early life appreciated the extraordinary combination of poetical and philosophical genius, so conspicuous in his friend Sir Humphry Davy, at that time in comparatively humble life, and by introducing him to Dr. Beddoes, he had the merit and good fortune of contributing to rescue from obscurity one of the greatest discoverers in modern chemistry.

In 1791, Mr. Gilbert was elected a Fellow of the Royal Society. His certificate describes him as being "devoted to mathematical and philosophical pursuits." It is signed by Thomas Hornsby, Savilian Professor of Astronomy, G. Shuckburgh, N. Maskelyne, George Staunton, and other Fellows. In 1804, he became Member of Parliament for Helstone, and at the general election in 1806, was chosen to represent Bodmin, and continued to sit for that borough until December, 1832. He was emphatically the representative of scientific interests in the House of Commons, and contributed by his exertions to carry many very important objects. Indeed, he was continually called on to serve on committees of inquiry touching scientific and financial questions. He acted as Chairman of the Committee for rebuilding London Bridge, which he caused to be widened ten feet; and we find him greatly contributing by his exertions to carry many very important public projects, amongst which may be mentioned, the Breakwater at Plymouth, and the bill for the revision of weights and measures, of which he was appointed a Commissioner. He was also a Member of the Board of Longitude.

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[2] Memoir in Lord Northampton's Anniversary Address to the Royal Society.

In Cornwall, his authority was continually appealed to on scientific questions, and he was ever ready to devote his time and talents to the service of his friends and country.

On the 8th April, 1808, he married Mary Ann Gilbert, only niece of Charles Gilbert of Eastbourn, in Sussex, under whose will he came into possession of considerable estates in that county; and, in compliance with its injunctions, obtained permission to assume the name and arms of Gilbert.

Mr. Gilbert contributed several important Papers on mathematical subjects to the *Philosophical Transactions*. He also printed three Addresses delivered as President of the Royal Society in 1828, 1829, and 1830. He was the author of numerous Papers in the *Quarterly Journal of Science and Arts*, and presented the world with the fruits of his labours as an antiquary, by publishing, in 1838, in four 8vo volumes, *The Parochial History of Cornwall*, founded on the manuscript histories of Mr. Hals and Mr. Tonkin. In this work he gives a valuable geological notice of the county, a subject, he observes, "of such recent origin that the very word (geology) does not occur in Chambers' *Encyclopœdia*, printed in 1783."

He was a diligent collector of ancient traditions, legendary tales, songs, and carols, illustrating the manners of the Cornish peasants; and printed various ballads at his house at Eastbourn. He possessed great memory and powers of quotation and anecdote. It has been said of him, "His most endearing talent was his power of conversation. It was not brilliant; it was something infinitely beyond, and better than mere display; it was a continued stream of learning and philosophy, adapted with excellent taste to the capacity of his auditory, and enlivened with anecdotes to which the most listless could not but listen and learn."

"His manners," says Dr. Buckland, "were most unaffected, child-like, gentle, and natural. As a friend, he was kind, considerate, forbearing, patient, and generous; and when the grave was closed over him, not one man, woman, or child, who was honoured with his acquaintance, but felt that he had a friend less in the world. Enemies he can have left not a single one[3]."

In July, 1819, he succeeded Samuel Lysons, Esq., in the office of Treasurer to the Royal Society, which office he retained until he was elected President. He was consequently on the Council during the whole of this period, and was rarely absent from their Meetings.

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[3] Anniversary Address before the Geological Society, 1840.

Mr. Gilbert did not follow the custom of former Presidents in giving soirées. Indeed, he had no town establishment calculated for the purpose, but he entertained parties of the Fellows at dinner at the Thatched House Tavern in St. James's Street[4]. His liberality was also manifested in another, and perhaps more useful manner. When Dr. Wollaston established the donation fund, Mr. Gilbert contributed the munificent sum of 1000*l.* to it.

After his retirement from Parliament, and the Chair of the Royal Society, he did not resign himself entirely to repose, but continued, notwithstanding his increasing infirmities of body, to co-operate with his fellow-labourers in the great field of science. He accepted a commission of investigation into the Stannary Laws of Cornwall, and frequented the various learned Societies of which he was a member, with great regularity.

In 1839, he became much weaker in health and spirits; and though he made a journey to Durham, and afterwards into Cornwall, where he presided for the last time at the Anniversary of the Royal Geological Society of Cornwall, of which he was President from its institution in 1814, he was evidently unequal to the task he had imposed upon himself. His last visit was to Oxford, which University had some years before conferred on him the title of D.C.L. From that period, he never went into public, and bidding farewell to London, retired to his house at

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[4] He received the Fellows of the Society and distinguished foreigners at breakfast in the Library of the Royal Society. These breakfasts took place every Thursday during the Session, and Col. Sabine and Captain Smyth acted as Vice-Chairmen.

Eastbourn on the 7th November, 1839, where he died, surrounded by his family, on the 24th of the following December. "His body was borne to the grave by his own labourers, and followed by his widow and family[5], in that primitive and unostentatious manner, which best suited the simplicity and natural humility of his own character[6]."

The Society possess two admirable representations of his finely formed head, and intelligent countenance. One, a portrait by the late Thomas Phillips, Esq., R.A., presented by Mr. Gilbert in January, 1834; the other, a bust by Richard Westmacott, Esq., a donation of Baroness Bassett in 1844.

We should have mentioned that in 1826, the Society acquired increased accommodation in Somerset House, by the grant of the rooms formerly appropriated to the business of the Lottery Office. Repeated applications had been made to Government for additional apartments, which were necessary for the purposes of the Society. Sir Robert Peel, in his letter upon this occasion, says that he has "the greatest satisfaction in informing the Council that, upon his recommendation, the Lords Commissioners of the Treasury have acceded to his request to place the apartments belonging to the Lottery Commissioners at the disposal of the Royal Society."

A Treasury Minute accompanied Sir Robert Peel's letter, stating that as soon as the final drawing of the lottery, which was about to take place, had concluded, the rooms would be given up to the Society[7].

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[5] These consisted of a son, the present John Davies Gilbert, Esq., F.R.S., and two daughters.

[6] Memoir in Lord Northampton's Anniversary Address.

It must be conceded that the change in the destiny of these apartments was happy. Consecrated to science instead of gambling; this was taking a step in advance, and in the right direction. But the liberality of Government did not terminate here, for a few months later (March 1, 1827), a communication was received from the Treasury, announcing that Government "contemplated appropriating a part of the house built for his late R.H. the Duke of York, to the use of the Royal Society[8]." At the ensuing Meeting of Council, this proposition was accepted conditionally, and Mr. Davies Gilbert was requested to view the apartments, and report upon their eligibility. At a subsequent Council it was resolved, "that the liberal offer on the part of his Majesty's Government of apartments in York House be accepted, subject to future arrangements."

Various circumstances, however, prevented the Society taking advantage of the offer of Government, the most influential of which was the probable increase of expenditure which the change would have involved[9].

It must have been peculiarly satisfactory to Mr.

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[7] Some of these apartments were afterwards ceded to the Geological Society, for which the thanks of the latter body were voted to the Royal Society.

[8] Now Stafford House.

[9] Mr. Robert Brown, who went over Stafford House with Mr. Gilbert, informs me, that the apartments were of a nature very unsuitable for the purposes of the Society.

Gilbert, that at the Anniversary in 1827, it devolved upon him to present one of the Royal Medals to Sir Humphry Davy, his predecessor in the Chair. "It is with feelings the most gratifying to myself," he observes in his Address, "that I now approach to the award of a Royal Medal to Sir Humphry Davy: and I esteem it a most fortunate occurrence, that this award should have taken place during the short period of my having to discharge the duties attached to the office of President; having witnessed the whole progress of Sir Humphry Davy's advancement in science and in reputation, from his first attempts in his native town to vary some of Dr. Priestley's experiments on the extrication of oxygen from marine vegetables, to the point of eminence which we all know him to have reached."

Then, after sketching the scientific labours of Sir Humphry Davy, Mr. Gilbert concludes thus :—

> "Sir Humphry Davy having last year communicated a Paper to the Society, in continuation of his former inductions and generalizations on chemical and electric energies, there cannot be a doubt, but that the only obstacle against his then receiving a Royal Medal on the first occasion that the Society had it to bestow, was his occupying this Chair. That obstacle, unhappily for science, no longer exists; and the Royal Society take this earliest opportunity of testifying their high estimation of those talents and of those labours which all Europe admires. We trust and hope, although our late President has been induced by medical advice to retire from the agitation of active public stations, that his most valuable life will be long spared; and that energies of mind may still be displayed to this Society

and to the civilized world, equal to those which have hitherto rendered immortal the name of Davy[10]."

In the years 1827 and 1828, Colonel Sabine communicated to the Society some important Papers on Terrestrial Magnetism, which have had no small share in setting in motion the gigantic machinery at present working at various localities upon the globe, for the purpose of elucidating the hidden laws of this most important branch of physics; of which, in the words of Sir John Herschel, "philosophers are yet busied in building and pulling down, casting and recasting their design, piecing together their scaffolding, and securing their foundations, for a far greater and more massive edifice than was at first contemplated[11];"

Although these secrets of nature which philosophers are now endeavouring to unfold, may not be "revealed while we yet live in the flesh," still it becomes desirable to place on record some account of the Society's labours in regard to this science, as the means employed for their discovery will form a great and lasting monument to the honour of the Royal Society[12].

Before adverting to these, we may briefly review the state of knowledge of magnetism existing prior to the establishment of the Society; and this is so admirably and lucidly communicated to us by Humboldt, that no excuse is offered for using his eloquent language.

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[10] Journal-book, Vol. XLV. p. 171.

[11] *Quarterly Review*, Vol. LXVI. p. 273.

[12] Col. Sabine has been so kind as to revise the following pages relating to the history of Terrestrial Magnetism.

"Columbus has not only the incontestable merit of having first discovered a line without magnetic variation, but also of having, by his considerations on the progressive increase of westerly declination in receding from that line, given the first impulse to the study of terrestrial magnetism in Europe.........We know positively from the Chinese *Penthsaoyan*, which was written under the dynasty of the Gong between 1111 and 1117, that the manner of measuring the amount of westerly declination had been then long understood. That which belongs to Columbus, is not the first observation of the existence of the variation (which for example, is noted in the map of Andrea Bianco in 1436; but the remarks which he made on the 13th September, 1492, that '2½° east of the Island of Corvo the magnetic variation changes, passing from N.E. to N.W.'.........But not only has Columbus the merit of having discovered the part of the Atlantic in which at that period the geographic and magnetic meridians coincided; he also made at the same time the ingenious and thoughtful remark, that the magnetic variation might serve to determine the ship's position in respect to longitude.........Neither the state of science nor that of the imperfect instruments employed at sea in 1493, whether for measuring angles or time, were competent to the practical solution of so difficult a problem. Under these circumstances Pope Alexander VI., in presumptuously dividing half the globe between two powerful states, rendered, without knowing it, an essential service to nautical astronomy, and to the physical science of terrestrial magnetism. The great maritime powers were from that time continually solicited to entertain innumerable, impracticable proposals. Sebastian Cabot, as we learn from his friend Richard Eden, still boasted on his death-bed, that there had been 'divinely revealed to him an infallible method of finding the longitude.' This revelation was no other than his firm belief, that the magnetic declination changed rapidly and regularly with the meridian. The cosmographer Alonzo de Santa Cruz, one of the instructors of Charles V., undertook the drawing up of the first general 'Variation Chart,' although indeed from very imperfect observations, as early as 1530, or a century and a-half before Halley. The movement of the magnetic lines, the first recognition of which is usually ascribed to Gassendi, was not even yet conjectured by William Gilbert; but at an early period, Acosta, 'from the information of Portuguese Navigators,' assumed four lines of no declination upon the surface of the globe. Hardly had the inclinometer, or dipping needle, been invented in England by Robert Norman, in 1576, than Gilbert boasted that, by means of this instrument he would determine the position of a ship in a dark and starless night (*aëre caliginoso*).........In the remarkable map of America appended to the Roman edition of the *Geography of Ptolemy* in 1508, we find to the north of Gruentland (Greenland) a part of Asia represented, and the magnetic pole marked as an insular mountain. Martin Cortez, in the *Breve Compendio de la Sphera* (1545), and Livio Sanuto, in the *Geographia di Tolomeo* (1588), place it more to the South. Sanuto entertained a prejudice which, strange to say, has existed even in later times, that a man who should be so fortunate as to reach the magnetic pole (*il calamitico*), would experience then *alcun miracoloso stupendo effetto*[13]."

It reflects no small renown on the Society, that the first chart showing the variation of the compass[14] (or, as it is now termed by some persons, the declination), based on the idea of employing curves drawn through points of equal declination, is due to Halley. "This chart," says Sir John Herschel, "and the very remarkable Papers by which its communication to the Royal Society was preceded, to say nothing of Halley's own personal labours and devotion, in his memorable voyages of magnetical discovery to St. Helena, must ever form a leading epoch in the science of terrestrial magnetism, and justly entitle him to be regarded as the father and founder of that science[15]."

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[13] *Cosmos*, translated under the superintendence of Col. Sabine, Vol. II. p. 280.

There is a very curious, and, at this time, particularly interesting passage in a Paper by Halley, to which allusion has been made before, published in the 195th Number of the *Philosophical Transactions*, where he expresses his belief "that he has put it past doubt, that the globe of the earth is one great magnet, having four magnetical poles or points of attraction, near each pole of the equator two; and that in those parts of the world which lie near adjacent to any one of those magnetical poles, the needle is chiefly governed thereby, the nearest pole being always predominant over the more remote."

Halley started this hypothesis as early as 1683. In 1692, he says :—

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[14] The first variation-compass was constructed before 1525, by an ingenious apothecary of Seville, Felipe Guillen. So earnest were the endeavours to learn more exactly the direction of the curves of magnetic declination, that in 1585, Juan Jayme sailed with Francisco Gali from Manilla to Acapulco, for the sole purpose of trying in the Pacific a declination instrument which he had invented. Humboldt, *Ess. Pal. sur la Nou. Es.* Tom. IV. p. 110.

[15] *Quarterly Review*, Vol. LXVI. p. 276.

"The nice determination of this, and of several other particulars in the magnetic system, is reserved for remote posterity; all that we can hope to do is to leave behind us observations that may be confided in, and to propose hypotheses which after ages may examine, amend, or refute; only here I must take leave to recommend to all masters of ships, and all others, lovers of natural truths, that they use their utmost diligence to make, or procure to be made, observations of these variations in all parts of the world, as well in the North as South latitude (after the laudable custom of our East India commanders), *and that they please to communicate them to the Royal Society*, in order to leave as complete a history as may *be to those that are hereafter to compare all together, and to complete and perfect this abstruse theory*."

Were Halley now alive, it would rejoice him to witness the efforts that are making to solve this difficult problem; and the more so, because the subject was allowed to slumber in its hidden recesses for many years. It is deserving of remark, that the inclination or dip of the needle, the other element of the magnetic direction, had long been known. It was, however, first recorded by Robert Norman[16], in a curious and scarce book published in 1576, entitled, *The New Attractive; containing a short Discourse of the Magnes or* Loadstone: *and amongst other his virtues, of a newe discouered secret and subtill propertie, concerning the declination of the* Needle, *touched*

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[16] William Gilbert, according to Humboldt, the first classical writer on terrestrial magnetism, "had so clear an idea of the imparting of the telluric magnetic force, that he ascribed the magnetic state of iron bars in the crosses on old church-towers or steeples to this circumstance." *Cosmos*, Vol. II. p. 332.

therewith under the plaine of the horizon, now first found out by Robert Norman, Hydrographer. The third Chapter explains: "By what meanes the rare and straunge Declyning of the Needle from the plaine of the horizon was first found."

"Hauing made many and diuers compasses, and using alwaies to finish and end them before I touched the needle, I found continually that after I had touched the yrons with the stone, that presently the North poynct thereof would bend or *declyne* downwardes under the horizon in some quantitie, insomuch that to the flie of the compass, which before was made equall, I was still constrained to putt some small piece of waxe in the south parts thereof, to counterpoise this declining and to make it equall againe.

"Which effecte hauing many times passed my handes without any greate regarde thereunto, as ignorant of any such propertie in the stone, and not before hauing heard or read of any such matter, it chaunced at length that there came to my handes an Instrument to bee made, with a Needle of sixe inches long, which Needle after I had polished, cut off at full length, and made it to staund leuell upon the pinn, so that nothing rested but only the touching of it with the stone: when I hadde touched the same, presently the North part thereof *declined* downe, in such sort that being constrained to cut away some of that parte to make it equall againe, in the end I cut it too short, and so spoiled the needle wherein I had taken so much paines.

"Hereby being straken into some cholar, I applyed myselfe to seeke further into this effecte, and making certain learned and expert men my friends acquainted in this matter, they advised mee to frame some Instrument, to make some exact triall, how much the Needle touched with the stone would *decline*, or what greatest angle it would make with the plaine of the Horizon."

The Author then proceeds to give a number of experiments which he made to ascertain how much the needle declined, or dipped.

Till within the last seventy years, it appears to have been the received opinion, that the intensity of terrestrial magnetism was the same at all parts of the earth's surface. In the instructions drawn up by the French Academy for the expedition under La Pérouse, the first intimation is given of a contrary opinion: it is recommended that the time of vibration of a dipping-needle should be observed at stations widely remote, as a test of the equality or difference of the magnetic intensity, suggesting also, that such observations should particularly be made at those parts of the earth where the dip was greatest, and where it was least. The experiments, whatever their results may have been, which, in compliance with this recommendation, were made in the expedition of La Pérouse, perished in its general catastrophe, but the instructions survived[17].

However, from the date of Halley's chart until 1811, the subject of magnetic variation remained in a most unsatisfactory state, although the law of the magnetic force occupied the attention of Newton, Gregory, and various other philosophers[18].

In the above year, M. Hansteen (whose attention had been turned for many years to magnetic phenomena,) was induced to undertake an examination of the subject, in consequence of the following prize question being proposed by the Royal Danish Academy :—"In order to explain the magnetic phenomena of the globe, is one magnetic axis sufficient, or must we assume more?" He gained the prize, by showing that the conclusions which Halley had drawn from the lines of declination, were confirmed by those of the dip, and by such observations of the intensity as were known at that period (1816).

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[17] See a Paper by Col. Sabine, "On Mag. Inten. of the Earth," in the 7th Rep. Brit. Assoc.

[18] There are several Papers in the *Transactions* on this subject, by Hauksbee, Brook Taylor, Canton, &c.

The results of Hansteen's labours appeared in his very remarkable and celebrated work, published in 1819, entitled, *Ueber den Magnetismus der Erde*, in which he clearly demonstrates, by means of a great number of facts, the fluctuations which this element has undergone during the last two centuries, confirming in great detail the position of Halley, that "*the whole magnetical system is in motion; that the moving force is very great, as extending its effects from pole to pole, and that its motion is not* per saltum, *but a gradual and regular motion.*"

In the Northern hemisphere, the general motion of the variation lines is from *West* to *East*, in the Southern hemisphere, from *East* to *West*. This will be apparent on an examination of Hansteen's charts of the variation at different epochs. There are certain exceptions, but these are very local, and are not contradictory to the general direction of the movement, but have a separate cause. The localities of these exceptions are on the east of the remarkable oval in Siberia, and on the west of the corresponding oval near Tahiti.

A great impetus was given to the study of terrestrial magnetism, by Humboldt's observations in the equinoctial regions of America. Freycinet's, Col. Sabine's, and Duperrey's observations, are traceable immediately to the labours of Humboldt.

The French Academicians, who drew up the instructions for La Pérouse, had imagined that the variation of the force would follow a law dependent on the dip, and that the force would be found to double between the line of no dip, and the two localities on the globe where the dip was known to approach to 90°. Humboldt considered that he had proved the truth of this law; but his observations had only embraced a comparatively small portion of the globe, where the true law does not differ very widely from that which he supposed. Hansteen, taking a more general view of the magnetic phenomena as known even at that time, showed that they were irreconcileable with the hypothesis adopted by Humboldt, and that there must necessarily be four points or poles of magnetic force, agreeably to the hypothesis which Halley had propounded in the *Philosophical Transactions* a century and a quarter before. Hansteen also drew the conclusion, that one of the points or poles of force must be, at the time he wrote (1819), to the north of Siberia; and in consequence of his publication, the Norwegian Government defrayed the expenses of his journey to Siberia[19], in which he proved his conjecture to be true. A further step in the investigation was effected by Colonel Sabine's observations in 1818, and 1822, in the Arctic circle, and near the equator, which showed that the northern locality, where the dip is 90°, was not, as previously supposed, one of the points or poles of greatest force.

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[19] "This," says Dr. Whewell, "they did at the very time when they refused to make a grant to the King for building a palace at Christiania."—*History of the Inductive Sciences*, Vol. III. p. 68.

But we must not forget that the geographical determination of the direction and intensity of the magnetic forces at different points of the earth's surface, originated with Halley; and that, admitting the labours in this direction of Humboldt, Hansteen, Erman, Lütke, Freycinet, Duperrey, Quetelet, and others, our own countrymen have not been forgetful of the recommendation of that most eminent man, as the contributions, furnished almost without exception by their voyages of discovery from the time of Cook, fully prove. In recent times, indeed, they have far outstripped all competitors. The magnetic survey of the British islands[20] has no parallel as yet in any country, and from the surveys either completed, or in progress by sea and land, such as those of which an account has been rendered in the magnetical contributions published in the *Philosophical Transactions*, we may look forward, at no very distant date, to complete charts of the magnetic dip, variation, and force, over the whole accessible surface of the globe, from observations made at one epoch, and chiefly by British observers. This will be the consummation of what Halley suggested.

Humboldt has remarked with great truth, "that the phenomena of the earth's magnetism in its three forms of variation, dip, and intensity, have of late years been examined with extraordinary care in the most different zones, by the united efforts of many travellers; and that there is scarcely any branch of the physical knowledge of the earth in which, in so small a number of years, so much has been gained towards an acquaintance with its laws, though not perhaps with its causes[21]."

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[20] Made in 1834, 5, 6. See 8th Report British Association.

Thus far our history of magnetism relates to its geographical distribution at the surface of the globe, and the consequent phenomena of the Isogonic, Isoclinal, and Isodynamic lines, which represent its distribution. All this is the work of magnetic surveys.

"But," says Col. Sabine, "these accomplish but one part of the determinations required for magnetic theory. The *periodical variations* of the magnetic direction and force[22], and their comparison with meteorological variations also of a periodical character, and those *secular changes* which, with slow but systematic progression, alter the whole aspect of the magnetic phenomena on the surface of the globe from one century to the next, and which in their nature are not improbably intimately connected with the causes of the magnetism of the globe itself; present subjects of scientific enquiry not less important in the view of those who, by the inductive process, would seek to ascend to general laws and to the discovery of physical causes[23]."

It is evident that for investigations of this kind, establishments of a national nature become necessary; fixed and permanent magnetic observations in short;

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[21] *Annalen der Physik*, Vol. xv. p. 320.

[22] The discovery of the very remarkable fact of the contemporaneous occurrence of magnetic disturbances over large portions of the earth's surface, was made on the 5th April, 1741, by the preconcerted observations of Celsius at Upsala, and Graham at London. Its re-discovery in the present century is due to a series of corresponding observations undertaken by Arago in Paris, and Kupffer in Kasan, in the years 1825 and 1826.

[23] Introduction to *Toronto Observations*, Vol. I. p. 9.

possessing an ample number of assistants, whose sole attention may be directed to ascertaining by observation the value of the magnetic elements with their periodical and secular variations.

Philosophers indeed generally began to perceive that without some definite plan of proceeding, multiplying random observations, made here and there at irregular periods, was not the course most likely to lead to desired results.

To the illustrious Humboldt attaches the merit of being the first to propose the establishment of magnetic observatories[24]. The commencement of any great undertaking is always an epoch of rare and lasting interest. The words of this distinguished philosopher throw the clearest light upon this part of our history :—

"When the first proposal to establish a system of Observatories, forming a net-work of stations, all provided with similar instruments, was made by myself, I could hardly entertain the hope that I should actually live to see the time when, thanks to the united activity of excellent physicists and astronomers, and especially to the munificent and persevering support of two governments, the Russian and the British, both hemispheres should be covered with magnetic Observatories. In 1806 and 1807, my friend M. Oltmanns, and myself, frequently observed the march of the declination needle at Berlin, for five or six days and nights consecutively from hour to hour, and often from half-hour to half-hour, particulary at the equinoxes and solstices. I was persuaded that *continuous uninterrupted* observations during several days and nights, were preferable to *detached* observations continued during an interval of many months[25]."

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[24] It would be unjust to the reputation of Halley to omit stating, that he was fully aware of the great importance of an extended series of observations. In his Paper on the variation published in 1683, he says, "There are a great number of observations requisite which *ought to be made at the same time, not at sea, but ashore,*" before the discovery "of secrets as yet utterly unknown to mankind, and which are reserved for the industry of future ages."—*Philosophical Transactions*, No. 148.

Political disturbances, always ruinous to the calm researches of the philosopher, for many years prevented Humboldt carrying his wishes into effect, and it was not until 1828 that he was enabled to erect a small Observatory at Berlin, whose more immediate object was to institute a series of simultaneous observations at concerted hours at Berlin, Paris, and Freiburg. In 1829, magnetic stations were established throughout Northern Asia in connexion with an expedition to that country which emanated from the Russian Government; and in 1832 Friedrich Gauss, the illustrious founder of a general theory of terrestrial magnetism, established the Magnetic Observatory at Göttingen, which was completed in 1834, and furnished with his ingenious instruments[26].

In 1836, Baron Humboldt addressed a long and highly interesting letter to the Duke of Sussex, then President of the Royal Society, urging the establishment of regular magnetical stations[27] in the British possessions in North America, Australia, the Cape of Good Hope, and between the tropics, not only for the observation of the momentary perturbations of the needle, but also for that of its periodical and secular movements[28]. This appeal was nobly responded to.

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[25] *Cosmos,* Vol. I. note 166.

[26] It was by the able assistance of W. Weber, that Gauss's instruments and method of observing were made known and brought into use throughout Italy, Sweden, and a large part of Germany.

[27] It is due to Col. Sabine to state, that he was fully impressed with the necessity of making continuous observations. See his letter to Mr. Renwick in *Journal of Science* for 1829.

The Royal Society, in conjunction with the British Association, called on Government to advance the necessary funds to establish magnetical observatories at Greenwich, and in various parts of the British possessions; and in 1839—40, magnetical establishments were in activity at St. Helena, the Cape of Good Hope, Canada, and Van Diemen's Land[29]. These are under the superintendence of Colonel Sabine, who has published two volumes, containing the observations made at Toronto in the year 1840, and at St. Helena in 1840—3.

The labours of the Royal Society in connexion with terrestrial magnetism, have been most effective. Abundant proofs of this will be found in the able and elaborate Reports of the Committee of Physics, expressly drawn up for the use of the Magnetical Observatories, and the Antartic Magnetical Expedition sent out by Government in 1839.

The munificence of the Directors of the East India Company founded and furnished, at the request of the Society, Magnetical Observatories at Simla, Madras, Bombay, and Singapore; and the observations will be published in a similar form to those of the British Colonial Observatories.

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[28] I very much regret that my limits will not allow me to insert this letter, and the more so, because it has never been entirely printed. The Committee to whom it was referred published an abstract of it in the *Proceedings of the Royal Society*. See Vol. III. p. 418.

[29] In 1837, the University of Dublin, at the instance of Dr. Lloyd, F.R.S., who has been of signal service to the science of magnetism in various ways, voted the necessary funds for the establishment of an Observatory.

"Thus from Toronto, in Canada, to the Cape of Good Hope and Van Diemen's Land, and from Paris to Pekin, since 1828, the globe has been covered by *magnetic observatories,* in which every movement or manifestation, regular and irregular, of the Earth's magnetic force, is watched by uninterrupted and simultaneous observation. A variation of $\frac{1}{40000}$ of the magnetic intensity is measured. At certain epochs observations are taken at intervals of two minutes and a half, and are continued during twenty-four consecutive hours. A great English astronomer and physical philosopher, Sir J. Herschel, has computed that the mass of observations to be discussed amount in three years to 195,840. Never before has an effort so grand, and so worthy of admiration, been made to investigate the *quantitative* in the laws of one of the great phenomena of nature[30]."

"Such a scheme," says Dr. Whewell, "combining world-wide extent with the singleness of action of an individual mind, is hitherto without parallel[31]."

The British stations were at first established to operate until 1845. But, in that year, it was resolved by the great magnetic congress held at Cambridge, that some of the observatories should be continued for an indefinite period, others till 1848[32]. In the mean while, the rich harvest of magnetical observations reaped by Sir James Ross in his Antartic Expedition, are undergoing discussion by Colonel Sabine, who is publishing the results in the *Philosophical Transactions*. . Several elaborate Memoirs have already appeared.

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[30] *Cosmos*, Vol. I. p. 178.

[31] *History of the Inductive Sciences*, Vol. III. p. 70.

[32] See 8th Report British Association, and the Minutes of the Greenwich Board of Visitors; for before the Cambridge Meeting, the Board had resolved that these observations should form a standing portion of the future Greenwich duties.

In the concluding portion of the second volume of *Cosmos*, Humboldt expresses a hope "that the year 1850 may deserve to be marked as the first normal epoch in which the materials of a magnetic map of the world shall be assembled." To this Colonel Sabine, in his translation of this work, has appended a note, the insertion of which will make this sketch of the history of terrestrial magnetism more complete :—

"The desire of M. de Humboldt is much nearer its fulfilment than he seems to have been aware of when the second volume of *Cosmos* was published in Germany, (October 1847). The Antartic Expedition of Sir James Ross has been followed by that of Lieuts. Moore, R.N., and Clerk, R.A., by which the magnetic survey of the accessible portions of the high latitudes of the southern hemisphere has been completed; by the voyages of Lieuts. Smith and Dayman, R.N. (1844 and 1845), between the Cape of Good Hope and Van Diemen's Land; of Lieut. More, R.N. (1846), to Hudson's Bay; and by the land expedition of Lieut. Lefroy, R.A. (1843—4), by which the whole of British North America, east of the Rocky Mountains, from the frontiers of the United States to the shores of Hudson's Bay and the Polar Ocean, has been magnetically surveyed. These were all special surveys, undertaken by the British Government expressly for the magnetical purposes which they accomplished; and with the exception of the observations in Lieut. Moore's Voyage to Hudson's Bay, which are now (February 1848), in process of reduction, their results have been deduced and published. In addition to special expeditions to parts of the globe which are either remote or difficult of access, the British Government has availed itself of the services of H.M. ships and vessels employed in hydrographical surveys, by directing that determinations of the three magnetic elements should be made by them at the several ports and harbours which they may visit, as well as at sea *daily*, as often as the weather permits in their passages from port to port. Such determinations have been executed, in whole or in part, by the surveying expeditions of Sir Edward Belcher (1837—1840, and 1843—7), to the north-west coast of America, the islands of the Pacific, and the Indian and Chinese Seas; of Captain Sullivan (1838—9), to the Falkland Islands; of Captain Allen (1841—2), to the western coast of Africa; of Captain Blackwood (1842—6), to Australia and Torres Strait; of Captain Barnett (1843—18 [33]), to Bermuda and the West Indies; of Captain Kellett (1845—18 [33]), to the Pacific; of the Arctic Expedition under Sir John Franklin (1845—18 [33]); of Captain Stanley (1847—18 [33]), to Australia and New Guinea; of Captain Moore (1848—18 [33]), to New Zealand. To these should be added, as a special undertaking at the expense of the East India Company, a magnetic survey of the islands of the Indian Archipelago, by Lieut. Elliott, of the Madras Engineers, commenced in 1846, and still in progress. When it is remembered that several of the above-named surveys include periods of three and four years, and in some instances, not only determinations at the several ports and harbours which may have been visited, but also daily observations, weather permitting, of the three magnetic elements at sea, in passages from port to port, the accumulation of materials, and their already extensive distribution over the surface of the globe, may in some degree be judged of. These surveys, with others which may be expected to be made under the present favourable disposition of Her Majesty's Government towards scientific researches, and, taken in conjunction with extensive magnetic surveys which are in progress on the continent of Europe, (particularly in the Austrian dominions), give a full promise of the speedy realisation of M. de Humboldt's wish so earnestly expressed, that the materials of the first general magnetic map of the globe should be assembled, and even permit the anticipation, that the first normal epoch of such a map will be but little removed from the year 1850[34]."

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[33] When the concluding date is not filled up, the observations are still in progress.

It is worthy of mention, that the Royal Society are at the trouble and expense of transmitting copies of the annual magnetical and meteorological[35] observations made at Greenwich, to every magnetical observatory (now amounting to fifty-four), besides other institutions. A similar course is pursued with the observations received from Russia.

In concluding these details of one of the most noble scientific enterprises that has occupied the attention of the Royal Society[36], it may be permitted to

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[34] *Cosmos*, Vol. II. note 514 *bis*.

[35] It is important to state, that meteorological observations are made at the magnetical observatories.

[36] Schiller's lines seem peculiarly applicable to these physical investigations:—

"Aber

advert to two very remarkable Papers published in the *Philosophical Transactions* for 1847, by Mr. Ronalds and Mr. Brooke, descriptive of self-registering photographic magnetometers, invented by those gentlemen[37]. Such an instrument was long considered a desideratum by Sir John Herschel and Mr. Airy. The latter has expressed his approval of the invention, which is in use at Greenwich[38], and Kew.

Returning to our history, it was during the Presidency of Mr. Gilbert that Dr. Wollaston established the Donation Fund. At a Meeting of Council, held on the 11th December, 1828, the following communication from him was read:—

"*No.* 1, *Dorset Street, November* 26, 1828.

"I HAVE this day vested 2000*l.* three per cent. Consolidated Bank Annuities, in the joint names of myself, and the President, Council and Fellows of the Royal Society of London, in trust, that the said Trustees shall during my life pay to me the dividends on the said stock, and that, after my decease, the President, Council and Fellows aforesaid, as surviving Trustees, shall apply the said dividends from time to time in promoting ex-

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"Aber im stillen Gemach entwirft bedeutende Zirkel
Sinnend der Weise, beschleicht forschend den schaffenden Geist
Prüft der Stoffe Gewalt, *der Magnete Hassen und Lieben*,
Folgt durch die Lüfte dem Klang, folgt durch den Aether dem Strahl
Sucht das vertraute Gesetz in des Zufall's grausenden Wundern—
Sucht den ruhenden Pol in Erscheinungen Flucht."

[37] The Council granted each of the above gentlemen 50*l.* from the Donation Fund.

[38] An account of the performance of the Magnetometer at Greenwich, during a remarkable magnetic disturbance, will be found in the *Philosophical Magazine* for January, 1848.

perimental researches, or in rewarding those by whom such researches may have been made, or in such manner as shall appear to the President and Council for the time being of the said Society, most conducive to the interests of the said Society in particular, or of Science in general; which latter application of the said dividends, will, in my opinion, be most creditable to the President and Council.

" And I hereby empower the said President, Council and Fellows, after my decease, in furtherance of the above-declared objects of the trust, to apply the said dividends to aid or reward any individual or individuals of any country, saving only that no person being a Member of the Council for the time being shall receive or partake of such aid or reward.

" And I hereby enjoin the said President, Council and Fellows, after my decease, not to hoard the said dividends parsimoniously, but to expend them liberally, and, as nearly as may be, annually, in furtherance of the above-declared objects of the trust.

" And I request the said President, Council and Fellows to entitle the Fund likely to be created, 'The Donation Fund,' in full confidence that there now are, and hereafter will be, other Fellows of the Royal Society who will make additional contributions to the said fund, in furtherance of that object for which the Royal Society was founded, the promotion of Natural Knowledge; and who will thus prove themselves to be really useful and valuable Members of the Society.

(Signed), " William Hyde Wollaston.
" *Witness,*
(Signed), " Henry Warburton."

The reading of this communication was followed by the subjoined Resolution:—

"That the most grateful thanks of the President and Council be given to Dr. Wollaston for his munificent Donation, accompanied by the assurance, that in the application of the interest arising therefrom, they will endeavour to fulfil in all respects the intentions he has expressed, and the objects he has recommended[39]."

At the same time, the Council were informed that Mr. Gilbert had contributed 1000*l.* to the above fund, and Mr. Hatchett 105*l.* These contributions were soon followed by the following:—from John Guillemard, Esq., 100*l.*, Henry Warburton, Esq., 105*l.*, and Sir Francis Chantrey 100*l.*; thus raising the fund to 3410*l.*[40]

A second communication was read from Dr. Wollaston, in which he transferred a large quantity of platinum and palladium to the Council, to be given "in aid of chemical experiments." This donation has been of essential service to many experimenters, to whom the Council have granted portions of these valuable metals[41].

A very important and, for the Society, beneficial change was made with respect to the Library in 1830.

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[39] Dr. Wollaston also left 1000*l.* to the Geological Society to found a Donation Fund.

[40] The fund now (1848) amounts to 4843*l.*

[41] A portion of the platinum has been employed in the construction of a Standard Troy Pound, which is preserved in the Instrument-room of the Royal Society. Stukeley, in his MS. Journal says, under the date of Dec. 13, 1750: "A piece of platinum was presented to the Society. It is called *platina del perito*, because of its silvery colour. The Spaniards sell it very dear, and make knife-handles, sword-handles, and many toys of it; it bears a good polish, and is not apt to tarnish. I guess it would be good for speculums to reflecting telescopes."

The Arundel Manuscripts (excepting the Hebrew and Oriental), were sold to the Trustees of the British Museum, for a sum which was devoted to the purchase of scientific books. This transfer, advantageous alike to the public and to the Society, was effected upon the express conditions that the manuscripts were to be kept distinct and separate from others, and to be called the Arundel Manuscripts[42]. The consent of the Duke of Norfolk to this arrangement was previously solicited, and obtained. The Manuscripts were valued by competent persons at 3559*l.*, the whole of which sum was expended in the purchase of foreign and English scientific works. It will be evident that the latter are far more useful to the Society than the Manuscripts, which treat principally of archæological, philological, and ecclesiastical matters, studies foreign to the pursuits of the Society. To the public, this exchange was equally beneficial, as greater access was given to the Manuscripts than could have been afforded at the Royal Society's library, with its more limited accommodation.

A trust of great importance devolved upon Mr. Gilbert while he was in the Chair of the Society, by the will of the Right Honourable and Reverend Francis Henry, Earl of Bridgewater, who died in February, 1829. This nobleman directed "eight thousand pounds to be invested in the funds, which sum, with the accruing dividends thereon, was to be held at the disposal of the President, for the time being, of the Royal Society of London, to be paid to the person or persons nominated by him. The testator further directed that the person or persons selected by the said President should be appointed to write, print, and publish, one thousand copies of a work, On the Power, Wisdom, and Goodness of God, as manifested in the Creation; illustrating such work by all reasonable arguments; as, for instance, the variety and formation of God's creatures in the animal, vegetable, and mineral kingdoms; the effect of digestion, and thereby of conversion; the construction of the hand of man, and an infinite variety of other arguments; as also by discoveries, ancient and modern, in arts, sciences, and the whole extent of literature." He desired, moreover, that the profits arising from the sale of the works so published should be paid to the authors of the works. Mr. Gilbert feeling strongly the great responsibility attaching to this trust, requested the assistance of the Archbishop of Canterbury, and the Bishop of London, in determining the best mode of carrying into effect the intentions of the Testator. Acting with their advice, Mr. Gilbert appointed the following eight gentlemen to write separate treatises, as here stated :—

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[42] An elaborate Catalogue of these Manuscripts has been printed by the British Museum. In the Preface, the collection is spoken of as being "singularly rich in the materials for the history of our own country, and language, and is of unusual interest in almost every branch of learning."

The Rev. William Whewell, F.R.S. *Astronomy and general Physics considered with reference to Natural Theology.*

The Rev. Thomas Chalmers, D.D. *On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man.*

John Kidd, M.D., F.R.S. *On the Adaptation of External Nature to the Physical Condition of Man.*

Sir Charles Bell, F.R.S. *The Hand: its mechanism and vital endowments as evincing design.*

Peter Mark Roget, M.D., F.R.S. *On Animal and Vegetable Physiology.*

The Rev. William Kirby, F.R.S. *On the History, Habits, and Instincts of Animals.*

William Prout, M.D., F.R.S. *On Chemistry, Meteorology, and the Functions of Digestion.*

The Rev. William Buckland, F.R.S. *On Geology and Mineralogy.*

With all the care and deliberation exercised by Mr. Gilbert, strengthened by the advice of the eminent Prelates mentioned above, his decision did not meet with general approbation. It was conceived by some that the testamentary dispositions of the Earl of Bridgewater had been misinterpreted:—that in fact, this nobleman intended that *one work* should be written, and not *eight*, and that, if one person could not be found competent to execute the laborious and highly difficult task, two or more learned and scientific men were to be called in to assist in compiling a volume of the nature mentioned in the will. No fault was found (and they would have been hypercritics indeed who could) with the gentlemen nominated by the President of the Royal Society, but it was, as has been stated, considered that the wishes of Lord Bridgewater had not been carried out.

Into this argument it is not my business to enter[43]; but it must be admitted that the *Bridgewater Treatises* are noble monuments of their originator's liberality, more permanent than those commonly reared by human hands to departed worldly greatness; for they were created by the minds of men who stand out amongst the highest intellectual beings of our age. And who can rise from their perusal without feeling, that not one only, but eight altars, have been erected to the attributes of the Omnipotent?

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[43] The reader will find this subject treated at some length in the 50th volume of the *Quarterly Review.*

The publication of the *Treatises* occupied several years. The last appeared in 1836[44].

One of the most active Committees during the time Mr. Gilbert was President was that of Meteorology. It was at their recommendation that the Water-Barometer in the Hall of the Society's apartments was erected.

The late Professor Daniell had long been of opinion that a good series of observations with a water-barometer accurately constructed, might throw some light upon several important points of physical science. He was sensible that the only way of constructing a barometer of the above description, was to form the whole length of tube of one piece of glass, and to boil the water in it as is done with mercury in the common barometer[45].

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[44] This was followed by Mr. Babbage's Ninth *Bridgewater Treatise* which, as the author states, was written to show that the power and knowledge of the great Creator of matter and mind are unlimited. Mr. Babbage considered that one of the chief defects of the *Bridgewater Treatises* arose from their not pursuing the argument of a great designing power to a sufficient extent.

[45] Water-barometers had been previously made, but of so faulty a nature as to be useless for delicate scientific investigations. In the first volume of the *Histoire de l'Académie*, there is a notice of some experiments made by M. Mariotte with a water-barometer compared with one of mercury, "*Dans l'un le mercure s'éleva à* 28 *pouces, et dans l'autre l'eau fut à* 31 *pieds* $\frac{1}{3}$." Otto Guericke also constructed a species of water-barometer. "It consisted," says Mr. Daniell "of a tube above 30 feet rising along a wall, and terminated by a tall and rather wide tube hermetically sealed, containing a toy of the shape of a man. The whole being filled with water, and set in a basin on the ground, the column of liquid settled

Great practical difficulties had to be overcome; one of the most formidable was to construct a glass tube of sufficient length and proper diameter. Professor Daniell contrived a plan for the purpose, which having met with the approval of the Committee of Meteorology, was ordered to be carried into execution. For a detailed account of the construction of this curious instrument, the reader must consult Professor Daniell's Paper on the subject, in the *Philosophical Transactions* for 1832. The description of the formation of the tube is however so interesting as to merit insertion:—

"Messrs. Pellatt and Co., of the Falcon Glass-House, very obligingly consented to permit the trial to be made at their works; such an undertaking never having been before attempted. Accordingly, a very strong packing-case was prepared of one-inch and a-half deal, forty-feet long, five-inches wide, and four-inches deep inside measure; with a cover of the same thickness to screw down upon it. This was carried to the glass-house, and being laid in the yard, with its cover off, small pieces of wood were placed across its bottom, at about one-foot intervals. The only instructions given to the workman were to make a tube of the length of the box, which should not be less than half-an-inch internal diameter, and as equal throughout its length as possible, and the manual dexterity with which he proceeded to effect this was well worthy of admiration. Having collected the glass at the end of his tube, and blown the cavity, a

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to the proper altitude, and left the toy floating on the surface, but all the lower part of the tube being concealed under the wainscoting, the little image made its appearance only in fine weather. To this whimsical contrivance he gave the name of *Anemoscope*, or *Semper Vivum*." *Philosophical Transactions*, 1832, p. 539.

boy attached another iron with a small lump of hot glass to the opposite extremity of the mass, and drew the tube out by walking away to the required distance. The curve of the hot glass was so great, that the workmen could scarcely prevent it from touching the pavement (which of course would have caused its instant destruction) by holding its extremities above their heads. While it was still red-hot and pliant, it was carefully laid upon the tranverse pieces in the box, and rolled backwards and forwards till cool; by which a perfectly cylindrical form was secured. While the drawing process was going on, others of the workmen fanned with their hats for the purpose of cooling the parts which appeared to be extending too fast; and by such simple means, a tube was perfected without a flaw, and of the greatest regularity, varying only from one-inch diameter at its lower extremity to 0·8 inch at its upper."

The facility and success attending the construction of this tube determined Professor Daniell to have another made, in case of any accident happening to the first.

The two tubes were placed in the box side by side. The cistern of the barometer was formed by a small copper steam-boiler, nearly filled with distilled water made to boil thoroughly, so as to free it from air; and the cock of the boiler being then closed, the water was raised in the tube by the pressure of the steam collected in the upper part of the cistern. The tube when filled was hermetically closed at the top[46], and a proper scale applied to it. The water in the cistern was protected from contact with the air by being covered with pure castor oil to the depth of half an inch.

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[46] This operation, one of great delicacy, was performed by Mr. Newman, who overcame the difficulties of the various processes with the greatest skill.

Daily, and subsequently, hourly observations were made, which continued for nearly a year and a half. It was then discovered that some gaseous matter had by some means insinuated itself into the tube. The boiler was opened and it was found that a portion of the liquid oil had escaped, and that the remainder had become covered with large flakes of a mucilaginous substance, by means of which it is probable that a communication had been established between the air and the water. Some curious and valuable results were however obtained, the most important, and that which alone would have amply repaid all the labour expended upon the subject, is the fact, that the Water-Barometer precedes by one hour the barometer of half an inch bore.

The great sensitiveness of the Water-Barometer is very remarkable; in windy weather the column of water is in perpetual motion, and during a heavy gale, its oscillations are extreme. The opening and sudden closing of the hall-door affects the column in a very perceptible degree. The subsequent history of the Water-Barometer is connected with painful associations. In November 1844 it was determined by the Council, at the request of Professor Daniell, that the instrument should be refilled. This he undertook to do[47]. It was his last official service to the Royal Society, for he died a few months after, in the Council-room, while attending a meeting of that body. It may be observed, that he conceived a solution of caoutchouc in naphtha would answer better than oil as a covering for the water in the cistern of the barometer. Although the greatest care was taken in the various operations connected with the refilling, it was found, at the expiration of a couple of months, that air had obtained admission into the tube, so that it would now be necessary, before using the barometer for exact scientific purposes, to refill it again.

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[47] An account of the refilling will be found in Daniell's *Meteorological Essays*, 3rd edition, Vol. II. p. 208.

It became the duty of the Society on the death of George IV. which occurred in June 1840, to tender an Address to his successor William IV.

The King, we are informed, received the Address very graciously; he immediately consented to become the Patron of the Society, and inscribed his name in the Charter-book on a page handsomely illuminated for the purpose. His Majesty at the same time declared, that "he would be proud to take every opportunity of promoting the interests of an Institution, whose great object is the cultivation of science and the discovery of truth."

It was Mr. Gilbert's determination, when elected President, to retain office for only a short period. His resolution to resign the Chair at the Anniversary in 1830, may have been strengthened by a desire to escape from dissensions which interrupted the harmony of the Society, and for a short period interfered with the legitimate objects of the ordinary Meetings.

About the middle of 1830, Mr. Babbage published a work entitled, *Reflections on the Decline of Science in England, and on some of its causes*[48], in which, as is well known, he animadverted in strong terms upon the constitution of the Royal Society, and proposed several changes for its amelioration.

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[48] See an ably written pamphlet in answer to Mr. Babbage's, entitled, *On the Alleged Decline of Science in England*, by Dr.

This publication led to some discussion in the Council, but no public notice was taken of it; and the usual thanks were returned to the author for a copy which he presented to the Society. In the following November, Sir James South published a pamphlet entitled *Charges against the President and Council of the Royal Society*, which contained accusations of a grave nature against the administration of the Society. Sir James transmitted a copy of his pamphlet to Mr. Gilbert for presentation to the Society; but the President considered that as the work was written in a disrespectful spirit, and calculated to bring the Society into disrepute, he was doing no more than his duty in rejecting it. This opinion having been elicited from Mr. Gilbert at the ordinary Meeting on the 25th November, in answer to a question from Sir James South, the latter "contended that it did not rest with the President to refuse any donations to the Society's library. He had come forward openly and manfully, and put his name to complaints against the Society, which he meant for its general benefit, and not for the purpose of injuring the feelings of any one of its members. This, if he had done, from his heart he begged forgiveness, but disclaimed having done it intentionally. It was one thing to make charges, and another to sub-

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Moll, of Utrecht. 8vo, London, 1831. And also a pamphlet published at the time anonymously, but since acknowledged to have been written by Dr. Granville, entitled, *Science without a Head*, 8vo, London, 1839, in which the author also endeavours to refute many of Mr. Babbage's views of the decadence of Science in England.

stantiate them; having done the former, he was most ready to do the latter[49]; he would now avail himself of his right as a Member to place his pamphlet on the table of the Society; having done which, he left the Meeting[50]."

No further debate took place on the matter beyond an attempt by some Members to prove that Sir James was justified by the Statutes in the course he had taken; and the scientific business of the evening was commenced.

But previously to this date, Meetings of several of the most influential Fellows of the Society had been held, with reference to the choice of a President and new Council. The following Resolutions were agreed to:—

"On the motion of Mr. Colebrooke, seconded by Dr. Fitton, it is, in the opinion of this Meeting, of the highest importance to the future well-being of the Royal Society, that the Officers and Council should be selected from among such Members of the Society as are, by their acquaintance with the condition and interests of science, best qualified to discharge such offices.

"It was moved by Mr. Herschel, and seconded by Mr. Faraday, that the President and Council be recommended to take into their consideration the propriety of making out a list of Fifty Fellows, out of whom they would advise the Council and Officers for the ensuing year to be chosen; and that such list contain:—First, the names of the Members of the existing Council, stating whether any and which thereof are dead or absent from the country. Secondly, the names of twenty-nine other Fellows, out of whom they would advise the Society to select persons to fill up the vacancies on the day of election."

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[49] But it is important to state that the charges were never proved; although two editions of the pamphlet have been circulated by Sir James South.

[50] *Athenæum*, November 27, 1830.

These Resolutions were acted on by the Council, who also recommended persons for the offices of Treasurer and Secretaries; but the selection of a President was left in the hands of the Society at large. Several individuals for this office were mentioned, but as the day of election approached two candidates only came forward. These were the Duke of Sussex, and Mr. (now Sir John) Herschel. At the beginning of November the following advertisement in favor of the latter appeared in the public papers, signed by sixty-three Fellows:—

"The undersigned Fellows of the Royal Society being of opinion that Mr. Herschel, by his varied and profound knowledge and high personal character, is eminently qualified to fill the office of President, and that his appointment to the Chair of the Society would be peculiarly acceptable to men of science in this and foreign countries, intend to put him in nomination on the ensuing day of election."

As a matter of course, considerable influence was used on both sides in favour of the respective Candidates; the result, however, remained doubtful[51].

On St. Andrew's day, the attendance of Fellows was unprecedentedly numerous, and included the principal philosophers of the day, as also several individuals of high rank and distinction. Mr. Gilbert took the Chair at 11 o'clock, and after delivering his Address, a ballot was taken for the Council. The election fell upon the Duke of Sussex, Sir R. Peel, Lord Melville, Sir G. Murray, Sir A. Cooper, Col. Fitzclarence, Dr. Roget, and Messrs. Barrow, Cavendish, Children, Lubbock, Peacock, Vigors, Barlow, Ellis, Faraday, Gilbert, Pond, Philip, Rennie, and Capt. Kater. A ballot for a President then took place, the result was :—

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[51] Dr. Granville's pamphlet, *Science without a Head*, to which allusion has been made, strongly advocated the election of the Duke of Sussex.

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Mr. (now Sir John) Lubbock was chosen Treasurer, and Dr. Roget and Mr. Children, Secretaries. It was resolved that a deputation should wait on his Royal Highness to communicate the result of the election; after which Mr. Gilbert thanked the Society for the attention shown to him during his Presidency. He then vacated the Chair, shaking hands in the most cordial manner with those around him.

CHAPTER XIV.

Retrospective Review of the Labours of the Society—Comparison between the Society and the French Institute—Independence of the Royal Society—Present State of Science at Oxford—Actual Condition of the Royal Society—Statutes—Session—Ordinary Meetings—Council Meetings—Scientific Committees—Special Committees—Philosophical Transactions—Proceedings—Library—Property of the Society—Income—Expenditure—Number of Fellows—Limited Accommodation—Expediency of providing suitable Premises for the Leading Chartered Societies—Conclusion.

IN accordance with the intention expressed in the Preface, I close my history of the Royal Society at this period.

It would have been easy to bring it down to a more recent time, but late events are too fresh in memory, to be impartially judged, and the majority of the individuals who would necessarily be brought under notice are yet happily amongst us : these considerations alone are sufficient to make me pause.

A survey has been taken of the history of the Society for the long period of one hundred and eighty-five years, during which its labours have embraced every branch of science, and, in the language of Sir John Herschel "obscurities which appeared impenetrable in physical and mathematical science, have been suddenly dispelled, and the most unpromising and barren fields of inquiry, converted, as if by inspiration, into rich and inexhaustible springs of knowledge[1]."

Stupendous indeed, are the discoveries in science, since the founders of the Royal Society went forth at early morn to collect May Dew; or with the *Virgula*

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[1] *Natural Philosophy*, p. 8.

Divina in search of the hidden treasures of the earth. The mind is baffled in attempting to comprehend their progress; and when we reflect on the eminent benefits conferred on mankind by these discoveries, Englishmen must feel an honest pride in the fact, that so large a proportion have emanated from the Fellows of the Royal Society, who stumbling at first, step by step, as it were in darkness, yet with persevering energy pressed onwards, and animated by their love of knowledge, out of obscurities deduced truth.

Thus says the discerning philosopher in the work above quoted:—

"The ridicule attached to *swing swangs* in Hooke's time, did not prevent him from reviving the proposal of the *pendulum* as a standard of measure, since so effectually wrought into practice by the genius and perseverance of Captain Kater; nor did that which Boyle encountered in his researches on the elasticity and pressure of the air, act as any obstacle to the train of discovery which terminated in the Steam-engine. The dreams of the Alchemists led them on in the path of experiment, and drew attention to the wonders of chemistry, while they brought their advocates (it must be admitted) to merited contempt and ruin. But in this case, it was moral dereliction which gave to ridicule a weight and power not necessarily or naturally belonging to it: but among the Alchemists were men of superior minds, who reasoned while they worked, and who, not content to grope always in the dark, and blunder on their object, sought carefully in the observed nature of their agents for guides in their pursuits:—to these we owe the creation of experimental philosophy[2]."

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[2] *Natural Philosophy*, p. 11.

To the studious inquirer no period of history is more interesting, than that in which science, emerging from the primeval darkness in which she had long been shrouded, began to assume a definite form, and exhibit her dependence on natural laws. Though marked by many disappointments and defeats, it is a most impressive, and salutary example of what unfettered mind may accomplish, and of the folly of attempting to prescribe metes and boundaries to the aspirings and longings after wisdom.

Well has another great writer observed :—

> "If science be manifestly incomplete, and yet of the highest importance, it would surely be most unwise to restrain inquiry, conducted on just principles, even when the immediate practical utility of it was not visible. In mathematics, chemistry, and every branch of natural philosophy, how many are the inquiries necessary for their improvement and completion, which, taken separately, do not appear to lead to any specifically advantageous purpose; how many useful inventions, and how much valuable and improving knowledge would have been lost, if a rational curiosity and a love of information had not generally been allowed to be a sufficient motive for the search after truth[3]."

This is a theme on which it would be gratifying to enlarge, for it is at once glorious and delightful : —but I must not dwell upon it. My office is of a more material character; that of a chronicler of facts. I trust, however, that no reader who has accompanied me thus far will rise from the perusal of these pages, without a feeling of gratitude to the Royal Society for their great share in labours, the results of which are now so materially administering to our comforts, multiplied as they are around us.

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[3] Malthus, *Prin. Pol. Econ.*, p. 16.

Let it be remembered, too, that from first to last, the Royal Society have received no annual pecuniary support from Government, nor assistance of any kind, beyond the grant of Chelsea College, shortly after their incorporation; and more recently, the use of the apartments they now occupy in Somerset House. This is a prominent feature in the history of our great scientific institution, and one in which the independence of the British character shines conspicuously.

Cuvier has some remarks on this subject, which are worthy of quotation :—

> "*La Société Royale de Londres, la plus ancienne des Académies des Sciences qui subsistent aujourd'hui, et sans contredit l'une des premières par les découvertes de ses membres, ne reçoit aucun sécours du gouvernement, et ne se soutient que par les seules contributions de ceux qui la composent: en conséquence, il a été nécessaire qu'elle fût très-nombreuse, et, par une conséquence non moins nécessaire, comme dans toutes les associations politiques où la participation des citoyens au gouvernement est en raison inverse de leur nombre, les hommes auxquels elle confie son administration exercent sur ses travaux, et jusqu'à un certain point sur la marche et sur les progrès des sciences, une influence plus considérable que nous ne pourrions nous le figurer dans nos Académies du continent*[4]."

France, it is true, has her justly celebrated Institute; but how wide is the difference between the nature of this establishment, and the Royal Society of England[5]!

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[4] *Mémoires de l'Institut*, 1826, p. 219.

The Members of the French Institute receive a yearly stipend; the Fellows of the Royal Society pay an annual sum for the support of their Institution, and the advancement of science. It would be repugnant to the feelings of Englishmen to submit to the regulations of the Institute, which require official addresses, and the names of candidates for admission into their body, to be approved by Government, before the first are delivered, or the second elected. The French *savans* are, it is true, ennobled and decorated by orders, which the wiser among them, in common with true philosophers of any country, regard with indifference. Nobly did Fourier say of Laplace: "Posterity, which has so many particulars to forget, will little care whether Laplace was for a short time minister of a great state. The eternal truths which he has discovered, the immutable laws of the stability of the world, are of importance, and not the rank which he occupied."

But it is generally acknowledged, and painfully felt, that science does not meet with that recognition and encouragement from our Government which may be considered justly due to its labours. Without fettering the freedom of research, it would be perfectly practicable, and indeed easy, to place the Royal Society in a position in which they might be of signal service to the state, as their scientific advisers[6]. In this age of progress, it seems paradoxical that science, which has done so much to raise the power and rank of England in the scale of nations, should be neglected as it is by the legislature and the nobility. In one of his excellent lectures, Davy eloquently says :—

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[5] The French Government grant annually 1,656,000 francs to the Institute, which is divided between the four Academies. This was written prior to the Revolution in Feb. 1848.

[6] As I write, the expenses of the new Houses of Parliament are before me, in which appears the item of 4000*l.* paid to geologists

"The progression of physical science is much more connected with your prosperity than is usually imagined. You owe to experimental philosophy some of the most important and peculiar of your advantages. It is not by foreign conquests that you are become great, but by a conquest of nature in your own country. It is not so much by colonization that you have attained your pre-eminence or wealth, but by the cultivation of the riches of your own soil. Why, at this moment, are you able to supply the world with a thousand articles of iron and steel necessary for the purposes of life? It is by arts derived from chemistry and mechanics, and founded purely upon experiments. Why is the steam-engine now carrying on operations, which formerly employed in painful and humiliating labour thousands of our robust peasantry, who are now more nobly or more usefully serving their country? It was in consequence of experiments upon the nature of heat and pure physical investigations.

"In every part of the world manufactures made from the mere clay and pebbles of your soil may be found; and to what is this owing? To chemical arts and experiments. You have excelled all other people in the products of industry. But why? because you have

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gists for reporting on various descriptions of stone for the building. Were the Royal Society the scientific adviser to the State, surely much of this expense might have been saved.

assisted industry by science. Do not regard as indifferent what is your true and your greatest glory. Except in these respects, and in the light of a pure system of faith, in what are you superior to Athens or to Rome? Do you carry away from them the palm in literature or the fine arts? Do you not rather glory, and justly too, in being in these respects their imitators? Is it not demonstrated by the nature of your system of public education, and by your popular amusements? In what, then, are you their superiors? In every thing connected with physical science, with the experimental arts. These are your characteristics. Do not neglect them. There is no country which ought so much to glory in the progress of science, which is so much interested in its success, as this happy island. Science has been a prime cause of creating for us the inexhaustible wealth of manufactures, and it is by science that it must be preserved and extended. Science, for its progression, requires patronage; but it must be a patronage bestowed, a patronage received with dignity. It must be preserved independent. It can bear no fetters; not even fetters of gold: and least of all, those fetters in which ignorance or selfishness may attempt to shackle it."

It must indeed be admitted, that by elevating and duly honouring science, the legislature would perform an act of justice, and at the same time benefit their country. The scientific man, it is well known, does not meet with that encouragement so liberally bestowed on other professions. His eminence is not recognized: he is too frequently forced to become a commercial speculator, amidst the harassing and perplexing cares of which, his original researches are often either neglected or abandoned. It is the want of patronage that drives science from the halls of our

Universities; for she has no such rewards to confer on her students, as those attached to the Bar, or the Church[7].

Oxford, where, as we have seen, the Royal Society was in a great measure reared,—Oxford, with her once philosophic Wadham College, presents now a melancholy spectacle, viewed with reference to scientific pursuits. When the British Association met within her venerable walls in 1847, the nobility of England had but one representative (the Marquis of Northampton), who stood alone in his zealous and unwearying patronage of science[8].

Mr. Lyell writes of this University:—

> "After 1839, we may consider three-fourths of the sciences, still nominally taught at Oxford, to have been virtually exiled from the University. The class-rooms of the professors were some of them entirely, others nearly deserted. Chemistry and botany attracted, be-

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[7] The Parliamentary returns of salaries paid to scientific men in the service of the State, compared with the amounts paid to other persons employed by Government, afford some extraordinary disclosures bearing on this question. Thus, it appears, that the office of Astronomer-Royal, requiring the highest possible education, and necessarily involving the continual exercise of the severest sciences, actually receives less remuneration than the *door-keeper* to the House of Commons, the qualifications to which post are of the humblest possible order: indeed, requiring merely a footman's capacity:—then again, the assistants to the Astronomer-Royal, gentlemen of superior education, receive about one-half of the salary accorded to the *hall-porters* at the Board of Trade, Admiralty, and *one-third* of that given to the *messengers* to the House of Commons. Really, unless these figures emanated from authority which is unquestionable, they could scarcely be received as authentic.

[8] The Sister Isle manifested greater zeal—Lords Enniskillen and Rosse, both Irish Peers, were present.

tween the years 1840 and 1844, from three to seven students; geometry, astronomy, and experimental philosophy, scarcely more; mineralogy and geology, still taught by the same professor, who, fifteen years before, had attracted crowded audiences, from ten to twelve; political economy still fewer; even ancient history and poetry scarcely commanded an audience; and, strange to say, in a country with whose destinies those of India are so closely bound up, the first of Asiatic Scholars gave Lectures to one or two pupils, and these might have been absent, had not the cherished hope of a Boden Scholarship for Sanscrit induced them to attend[9]."

This is very gloomy, since it asserts that a source from which we should expect the fertilising streams of science to flow forth and enrich our industrial prosperity, is dried up[10].

A moderate amount of encouragement might change all this. Without taking by munificent pensions, the "*monarchìa di se stesso*," from the man of science, he might be placed in circumstances to pursue his studies with unwearied diligence, holding an even course between wealth and poverty.

It will now be desirable to give an account of the present condition of the Society, without which this work would be incomplete.

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[9] *Travels in North America*, Vol. I. p. 298.

[10] As I write (May 1848), a Memorial to Government on the subject of University reform is undergoing signature, and has already been signed by 239 Members of the Universities of Oxford and Cambridge, and some Fellows of the Royal Society. The Memorialists contend that the present system of the Universities is not calculated to advance the interests of religious and useful learning, and that changes are imperatively called for.

The Statutes which have been recently amended[11] are printed in the Appendix. They are enacted by the Council, who have this power vested in them by the Charter; and contain the laws at present in force for the management of the Society. These are so clear and comprehensive, as to require scarcely any explanation or addition. It will not, however, be out of place to give a brief account of the routine business of the Society during the year, as laid down in the Statutes.

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[11] The alterations refer solely to the manner of electing Fellows. Formerly, as the reader is aware, candidates were proposed and ballotted for, after their certificates had been suspended during five ordinary Meetings; but it having been found that this mode of election was not sufficiently restrictive, new Statutes were enacted. It will be seen by the subjoined Table, that the elections during past years have greatly outnumbered the deaths.

Number of Fellows elected into the Royal Society, and number deceased, from 1801, to 1840, inclusive:—

Years.	Elected.	Deceased.	Years.	Elected.	Deceased.	Years.	Elected.	Deceased.	Years.	Elected.	Deceased.
1801	24	20	1811	29	17	1821	45	16	1831	27	16
1802	21	19	1812	25	17	1822	29	20	1832	26	20
1803	16	20	1813	16	12	1823	16	29	1833	16	17
1804	22	16	1814	27	16	1824	26	11	1834	50	21
1805	20	19	1815	32	24	1825	15	17	1835	33	25
1806	19	16	1816	35	20	1826	33	10	1836	12	31
1807	23	18	1817	26	17	1827	23	18	1837	23	31
1808	19	11	1818	38	20	1828	30	19	1838	32	22
1809	16	17	1819	46	15	1829	34	28	1839	38	22
1810	27	21	1820	32	16	1830	37	19	1840	33	33
Totals	207	177		306	174		278	187		290	238

It thus appears, that during a period of 40 years ending 1840, 1081 Fellows were elected into the Society, and 776 died; giving an average of 27·1 per cent. annually elected, and 19·4 annually deceased.

The Session commences on the third Thursday in November, previously to which, a card of the Meeting-days, and a list of the proposed new Council, are sent to every Fellow of the Society. On Saint Andrew's day, or on the day after, should that day fall on Sunday, the Anniversary Meeting is held for the election of the President, Officers, and Council; after which, the Fellows and their friends dine together. Hitherto, the Medals have been distributed, and the President's Address delivered, at the Anniversary; but the day for the election of Fellows (in June) is now devoted to these purposes.

The evening Meetings continue with the intermission of the Christmas, Easter, and Whitsun vacations, until the third Thursday in June. As soon as the President or, in his absence, a Vice-President, takes the Chair, the Mace is placed upon the table before him[12]. He then reads the names of those individuals who desire, on the introduction of Fellows, to attend the Meeting, and who, on leave being granted, are admitted into the Meeting Room from the ante-chamber, where they are in waiting.

The Senior Secretary, who sits on the right of the President, then reads the Minutes of the last Meeting, and an abstract of the Paper or Papers read on that occasion; after which, any newly-elected Fellow who is present, and has not been formally admitted, inscribes his name in the Charter-book, and is introduced by a Fellow to the President, who admits him according to the form prescribed in the Statutes (Chap. I. Section 14).

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[12] The Charter empowers the President to wear his hat while in the Chair; a custom formerly observed, but now fallen into disuse.

The Junior Secretary, who sits on the left of the President, next announces the Presents made to the Society[13], he then reads the Certificates of Candidates for election[14], and proceeds to read such Paper, or Papers, as may have been thought proper to be communicated to the Meeting. At the conclusion of the reading, the President calls on the Society to return their thanks to the Author or Authors of the Papers read, which are thenceforth the property of the Society. A discussion is then invited on the subject treated of in the Paper, which is more or less animated, according to the subject, and the number of Fellows present.

When the speakers have concluded, the President adjourns the Meeting, and the Fellows proceed with their friends to the Library, where they partake of tea[15]. A *conversazione* ensues, which lasts until about eleven o'clock. These reunions are extremely agreeable, and are frequently honoured by the presence of distinguished foreigners who happen to be visiting London.

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[13] These are so numerous, that their titles fill, on an average, two folio pages weekly during the Session.

[14] Previously to the last alteration of the Statutes (1847), Candidates, whose Certificates had been duly suspended, were put to the ballot at this part of the proceedings. Now, only the privileged classes, and Candidates for Foreign Memberships, are ballotted for.

[15] This is provided at the expense of Lord Northampton; the custom having originated with Sir H. Davy, who, as has been stated, transferred the weekly parties of the Fellows from his house to the Library of the Society, upon the understanding that he was to defray the expense of the refreshment.

The Council Meetings are held monthly, or more frequently, if necessary. The President always gives the Assistant-Secretary directions when he wishes a Council to be summoned.

The Scientific Committees assemble as occasion requires. Those annually appointed are; Mathematics, Astronomy, Physics, Chemistry, Geology, Botany, Zoology, and Animal Physiology.

The number of Members on each Committee, varies from 15 to 30. The largest Committee is that of Physics, which comprises 30 Members. Any Committee may recommend the Council to add a Fellow to their number whose information and learning render him a desirable acquisition.

The Council are empowered at any time to appoint special Committees.

The *Philosophical Transactions* are generally published in two parts, viz.: The first on the third Thursday in June, and the second on the third Thursday in November. These two parts form a Volume, but should there be a press of matter, a third, and even fourth part, are occasionally published.

Besides the *Transactions*, Abstracts of the Papers, and Minutes of the Ordinary Meetings are published monthly, to give early publicity to important discoveries, &c. These date from the year 1800; they are entitled *Proceedings of the Royal Society*[16], and at this period extend to more than four Volumes.

The Library which now contains upwards of

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[16] By a recent regulation of Council, authors of Papers are required to send an abstract of their Paper with the communication; the abstract being subject to the revision of the Senior Secretary.

40,000 volumes, is extremely rich in the best editions of scientific books. Besides these, there is a large number of rare and valuable theological and historical works. Fellows are allowed to borrow books under certain regulations; a great advantage to those engaged in scientific pursuits at home; many avail themselves of this privilege, and still more use is made of the Library for purposes of reference.

The rapidly increasing number of works will render it necessary, before many years elapse, to provide additional accommodation. At present the books occupy five rooms, consisting of two large rooms on the upper floor called the Upper Library, the Lower Library or office, the Council Room, and Instrument Room.

Very complete Catalogues of the Books, Manuscripts, and Letters, were published in 1841. They are sold to the Fellows and the public, in the form of two octavo volumes; one, containing the Scientific works, the other, the Miscellaneous Literature, Manuscripts, and Letters. A Catalogue has also been lately made of the Maps, Charts, Engravings, Drawings, &c. in the possession of the Society, which exceed 5000 in number. In consequence of the determination of the Council to allow the Assistant-Secretary the services of a Clerk, uninterrupted daily attendance during the usual office hours is given at the rooms throughout the year.

The property of the Society, independently of their Library, Furniture, Portraits, Stock of *Philosophical Transactions*, and Philosophical Instruments, consists of Landed Estates, and Money in the Public Funds.

There are three Estates, one at Mablethorpe in Lincolnshire, consisting of 55 acres; one at Acton in

Middlesex, comprising 33 acres; and a fee farm-rent at Lewes in Sussex, yielding 19*l.* 4*s.* per annum.

The property of the Society in the Public Funds amounts at this date (May 1848) to 33,411*l.* 11*s.* 9*d.*, but this includes 8574*l.* 7*s.* held on trust.

The Society's Income arises from the following sources. 1. Rents of Estates. 2. Dividends on Funded Property. 3. Annual Subscriptions. 4. Admission Fees. 5. Compositions. 6. Sale of *Transactions* and *Proceedings*. The total Annual Income of the Society has of late years considerably exceeded the expenditure: the latter includes the following items. 1. Salaries. 2. Assessed Taxes[17]. 3. Printing, paper and engraving. 4. Purchase of books and binding. 5. House repairs. 6. Fire Insurance. 7. Fuel and light. 8. Postage, parcels, and miscellaneous. The total number of Fellows on the book at the last Anniversary (November 1847) was; 13 Patron and Honorary, 47 Foreign, 483 having compounded; 18 paying 2*l.* 12*s.* annually, and 260 paying 4*l.* annually; making a total of 821.

The apartments of the Society have been alluded to in reference to the Library. These, it must be admitted, are sadly inadequate, and unsuitable for the wants and purposes of the first scientific Institution of England. To say nothing of their limited accommodation, they are situated in a part of the Metropolis which can no longer be regarded as central to the scientific world. The eastern end of the Strand, that artery of never-ceasing commerce and bustle, can scarcely be considered the appropriate locality for the pursuits of philosophy.

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[17] It is worth recording, that although occupying apartments in a Government-house, the Society are called on to pay the window-duties.

But hopes are entertained, that when the present period of financial distress shall have passed away, an edifice in accordance with the dignity and requirements of the Royal Society may be erected, to which we may point with patriotic pride, as an ornament to the Metropolis and a monument to science. A very small sum would effect this; and indeed it is paradoxical to hear of millions of pounds being expended on a Palace of florid gothic architecture for the two estates of Parliament, by far the largest of which is that representing the people, when the principal Scientific Society of the Country, to which so much is due, is allowed to remain in the obscurity of the corner of a building devoted to Government offices.

But there is more to be gained by such a step than the mere adornment and dignifying of science. It may be materially benefitted. The time has passed when the Royal Society stood alone as the representative of all the sciences. The increase of population and education naturally resulted in an increase of scientific men, and, as we have seen, new Associations were formed for the cultivation of various branches of science, which could hardly have been done effectually by the limited funds of the Parent Society. These new Societies, it cannot be denied, have done much to enrich our stores of knowledge, and enlarge the realms of science; but there is a weakening tendency in their very numbers, a frittering away, if we may be allowed the expression, of valuable time and abilities. Societies growing out of societies, each encumbered with the expensive machinery of apartments and officers, each setting up on a smaller scale what is often unnecessary, as far as the wants and interests of Science are concerned. Indeed, the multiplication of Scientific Societies in London must have a certain injurious effect; already the seeker for information is bewildered by their number, and the discoverer of a new fact is at a loss where to offer his contribution. To the poor ambition of starting and presiding over a Society, may the ramifying nature of our scientific bodies be in a great measure ascribed :—philosophy can scarcely require so many temples; for as in art, so in science, there is a bond of fellowship[18]: "*Omnes artes, quæ ad humanitatem pertinent habent, quoddam commune vinculum, et quasi cognatione quâdam inter se continentur*[19]."

The union of Libraries, not the heaping together of books belonging to the various Societies, but their vicinity to each other, would give strong intellectual power to the man of science. Thus, each Society would have its Library consisting mainly of books relating to the science of the Institution—and in a few moments it would be seen whether the work required was accessible. Then again, the expense incurred by the multiplication of books would be avoided. At present a scientific work is probably purchased by several societies, whereas were the Libraries under one roof, one, or at most two copies, of the book would be sufficient.

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[18] Half a century hence, the philosopher in search of the history of a discovery will be sorely perplexed, amongst the numberless Transactions and Proceedings of Scientific Societies, to get at facts. It would be a great assistance to the right understanding of the history of science, if the *Philosophical Transactions* contained, as in former times, the first account of philosophical discoveries.

[19] Cicero, *De Rep.*, II. 4.

It is well known that our great National Library does not enable the scientific student to avail himself of recent works—indeed, it frequently happens that the officers of the British Museum send to the Library of the Royal Society for works not accessible in the Museum; and we are told that two or three years elapse before a new work is entered in the Museum-Catalogue. These facts make it the more important that some plan should be adopted to render the access to modern scientific publications as prompt and easy as possible.

In the Palace now rising on the banks of the Thames at Westminster, we have an example which might be followed with advantage. Under the same roof are the houses of Lords and Commons—the Libraries, Committee-Rooms, and all the halls and apartments necessary for the one great object—legislation; and were Government to erect a mansion for the Royal Society, it might be so built as to contain also under the same roof the leading Chartered Societies, some of which occupy apartments in Somerset-House too small and inconvenient for their purposes.

Such a plan need in no way interfere with the individuality of the Royal Society; while, by bringing the sciences into closer communion, their progress would be materially favoured. And surely, when it is remembered how much has been done by the past and present Members of this body in the great work of civilization, and the improvement of the social condition of mankind, Englishmen ought not to rest satisfied until their leading Scientific Institution has as suitable a home as that provided for the Institute of France, with, however, the right of maintaining its long-continued independence of action.

APPENDIX.

1. First Charter.
2. Second Charter.
3. Third Charter.
4. License to purchase in Mortmain.
5. Statutes enacted in 1663.
6. Statutes enacted in 1847.
7. Presidents of the Society.
8. Treasurers of the Society.
9. Secretaries of the Society.
10. Foreign Secretaries of the Society.
11. Clerks and Assistant Secretaries of the Society.
12. Numbers and Volumes of the *Philosophical Transactions.*
13. Classification of Papers contained in the *Philosophical Transactions.*
14. Awards of the Copley Medal.
15. Awards of the Royal Medal.
16. Awards of the Rumford Medal.
17. Certificate of a Candidate for Election.
18. Catalogue of Portraits and Busts.

APPENDIX I.

CHARTA PRIMA,

Praesidi, Concilio, et Sodalibus REGALIS SOCIETATIS Londini, a Rege CAROLO SECUNDO concessa, *A.D.* MDCLXII.

CAROLVS SECVNDVS Dei gratia Angliae Scotiae Franciae et Hiberniae Rex, fidei Defensor, etc, omnibus, ad quos praesentes Literae pervenerint, salutem.

DIV multumque apud nos statuimus, ut imperii fines, sic etiam artes atque scientias ipsas promovere. Favemus itaque omnibus disciplinis; particulari autem gratia indulgemus philosophicis studiis; praesertim iis, quae solidis experimentis conantur aut novam extundere philosophiam, aut expolire veterem. Vt igitur inclarescant apud nostros hujusmodi studia, quae nusquam terrarum adhuc satis emicuerunt; utque nos tandem universus literarum orbis non solum fidei defensorem, sed etiam veritatis omnimodae et cultorem ubique et patronum semper agnoscat.

SCIATIS, quod nos de gratia nostra speciali ac ex certa scientia et mero motu nostris ordinavimus constituimus concessimus et declaravimus, ac per praesentes pro nobis heredibus et successoribus nostris ordinamus constituimus concedimus et declaramus, quod de caetero in perpetuum erit Societas de Praesidente[1] Concilio et Sodalibus consistens, quae vocabitur et nuncupabitur *Regalis Societas.* Et eandem Societatem, per nomen *Praesidis Concilii et Sodalium Regalis Societatis*, unum corpus corporatum et politicum in re facto et nomine realiter et ad plenum, pro nobis heredibus et successoribus nostris, facimus ordinamus creamus et constituimus per praesentes, et quod per idem nomen habeant successionem perpetuam; Et quod ipsi et eorem successores (quorum studia

Incorporation, and Corporate Name.

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[1] *Sic in* Authentic.

applicanda sunt ad rerum naturalium artiumque utilium scientias experimentorum fide ulterius promovendas) per idem nomen *Praesidis Concilii et Sodalium Regalis Societatis* praedictae, sint et erunt perpetuis futuris temporibus personae habiles et in lege capaces ad habendum perquirendum percipiendum et possidendum terras et tenementa prata pascua pasturas libertates privilegia franchesias jurisdictiones et hereditamenta quaecunque sibi et successoribus suis in feodo et perpetuitate, vel pro termino vitae vitarum vel annorum, seu aliter quocunque modo, ac etiam bona et catalla ac omnes alias res cujuscunque fuerint generis naturae speciei sive qualitatis; Necnon ad dandum concedendum dimittendum et assignandum eadem terras tenementa et hereditamenta bona et catalla, et omnia facta et res necessarias faciendum et exequendum de et concernentia eisdem[2], per nomen praedictum; Et quod per nomen *Praesidis Concilii et Sodalium Regalis Societatis* praedictum, placitare et implacitari, respondere et responderi, defendere et defendi, de caetero in perpetuum valeant et possint, in quibuscunque curiis placeis et locis, et coram quibuscunque Iudicibus et Iusticariis et aliis personis et officiariis nostris heredum et successorum nostrorum, in omnibus et singulis actionibus placitis sectis querelis causis materiis rebus et demandis quibuscunque, cujuscunque sint aut erunt generis naturae vel speciei; eisdem modo et forma, prout aliqui ligei nostri intra hoc regnum nostrum Angliae, personae habiles et in lege capaces, aut ut aliquod corpus corporatum vel politicum intra hoc regnum nostrum Angliae, habere perquirere recipere possidere dare et concedere, placitare et implacitari, respondere et responderi, defendere vel defendi, valeant et possint, valeat et possit; Et quod iidem Praeses Concilium et Sodales Regalis Societatis praedictae et successores sui habeant in perpetuum commune Sigillum, pro causis et negotiis suis et successorum suorum quibuscunque agendis deserviturum; et quod bene liceat et licebit eisdem Praesidi Concilio et Sodalibus Regalis Societatis praedictae, et successoribus suis pro tempore existentibus, Sigillum illud de tempore in tempus frangere mutare et de novo facere, prout iis melius fore videbitur expediri.

Capacity to purchase;

and to grant;

To sue and be sued;

To have a Common Seal,

Alterable at pleasure.

Et, quod intentio nostra regia meliorem sortiatur effectum, ac pro bono regimine et gubernatione praedictae Regalis Societatis de tempore in tempus, VOLVMVS, ac per praesentes pro nobis heredibus et successoribus nostris concedimus iisdem Praesidi Concilio et Sodalibus Societatis Regalis praedictae et successoribus suis, quod de caetero in perpetuum Concilium praedictum erit et consistet ex viginti et una personis (quarum Praesidem semper unum esse volumus); Et quod omnes et singulae aliae personae, quae intra unum mensem proximum sequentem post datum praesentium per Praesidem et Concilium, et in omni tempore sequenti per Praesidem Concilium et Sodales, in eandem Societatem accipientur et admittentur ut Membra Regalis Societatis praedictae, et in Registro per ipsos conservando annotatae fuerint, erunt vocabuntur et nuncupabuntur *Sodales Regalis Societatis* praedictae: quos, quanto eminentiùs omnis generis doctrinae bonarumque literarum studio clarescant, quanto ardentiùs hujusce Societatis honorem studia et emolumentum promoveri cupiant, quanto vitae integritate morumque probitate ac pietate emineant, et fidelitate animique erga nos coronam et dignitatem nostram sincero affectu polleant; eo magis idoneos et dignos, qui in Sodalium ejusdem Societatis numerum adsciscantur, omnino censeri volumus.

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[2] *Sic in* Authentic.

The Council to consist of 21, (of whom, the President to be always one.)

The Fellows to be chosen in the first Month, by the President and Council; after that Month, by the President, Council, and Fellows.

Et, pro meliori executione voluntatis et concessionis nostrae in hac parte, ASSIGNAVIMVS nominavimus constituimus et fecimus, ac per praesentes pro nobis heredibus et successoribus nostris assignamus nominamus constituimus et facimus, praedilectum et fidelem nobis Willielmum Vicecomitem *Brouncker*, Cancellarium praecharissimae consorti nostrae Reginae Catherinae, fore et esse primum et modernum Praesidem Regalis Societatis praedictae; volentes quod praedictus Willielmus Vicecomes *Brouncker* in officio Praesidis Regalis Societatis praedictae à datu praesentium usque ad festum Sancti Andreae proximum sequens post datum praesentium continuabit, et quousque unus alius de Concilio Regalis Societatis praedictae pro tempore existente ad officium illud debito modo electus praefectus et juratus fuerit, juxta ordinationem et provisionem in his praesentibus inferiùs expressam et declaratam (si praedictus Willielmus Vicecomes *Brouncker* tam diu vixerit); sacramento corporali in omnibus et per omnia officium illud tangentia bene et fideliter exequendum, secundùm veram intentionem harum praesentium, coram praedilecto et perquàm fideli consanguineo et consiliario nostro Edwardo Comite *Clarendon*, Cancellario nostro Angliae, priùs praestito: cui quidem Ed-

William, Viscount Brouncker, to be the first President.

To hold till St. Andrew's Day next, (if he shall so long live), and till another out of the Council be chosen and sworn.

But first to be sworn in before the Lord Chancellor.

wardo Comiti *Clarendon*, Cancellario nostro praedicto, sacramentum praedictum administrare plenam potestatem et authoritatem damus et concedimus, in haec verba sequentia, viz.

The President's Oath.

I William Viscount Brouncker *doe promise to deale faithfullie and honestlie, in all things belonging to the trust committed to mee as President of this Royall Societie, during my employment in that capacitie: So helpe me God!*

The first Council named.

Assignavimvs etiam constituimus et fecimus, ac per praesentes pro nobis heredibus et successoribus nostris facimus, dilectos nobis et fideles Robertum *Moray* Militem unum à secretioribus nostris conciliis in regno nostro Scotiae, Robertum *Boyle* Armigerum, Willielmum *Brereton* Armigerum, filium primogenitum Baronis de *Brereton*, Kenelm. *Digby* Militem praecharissimae matri nostrae Mariae Reginae Cancellarium, Paulum *Neile* Militem unum Generosorum camerae privatae nostrae, Henricum *Slingesby* Armigerum alium Generosorum praedictae privatae camerae nostrae, Willielmum *Petty* Militem, Iohannem *Wallis* in theologia Doctorem, Timotheum *Clarke* in medicinis Doctorem et unum Medicorum nostrorum, Iohannem *Wilkins* in theologia Doctorem, Georgium *Ent* in medicinis Doctorem, Willielmum *Aerskine* unum a poculis nostris, Ionathan. *Goddard* in medicinis Doctorem et Professorem Collegii de *Gresham*, Christopherum *Wren* in medicinis Doctorem, *Saville* astronomiae Professorem in academia nostra Oxoniensi, Willielmum *Balle* Armigerum, Matthaeum *Wren* Armigerum, Iohannem *Evelyn* Armigerum, Thomam *Henshawe* Armigerum, *Dudley Palmer* de *Greys Inn* in comitatu nostro Middlesexiae Armigerum, et *Henricum Oldenburg* Armigerum, una cum Praeside praedicto, fore et esse primos et modernos viginti et unum de Concilio Regalis Societatis praedictae; continuandos in eisdem officiis à datu praesentium usque ad praedictum festum Sancti Andreae Apostoli proximum sequens, et deinde, quousque aliae idoneae personae et habiles et sufficientes in officia praedicta electae praefectae et juratae fuerint (si tam diu vixerint, aut pro aliqua justa et rationabili causa non amotae[3] fuerint); sacramentis corporalibus coram Praeside praedictae Regalis Societatis, ad officia sua bene et fideliter in omnibus et per omnia officia illa tangentia exequendum, prius praestandis, secundum formam et effectum

To continue as above, unless amoved for just Cause.

But first to take, before the President, the like oath as his, mutatis mutandis.

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[3] *Sic in* Authentic.

praedicti sacramenti, mutatis mutandis, Praesidi Regalis Societatis praedictae per Cancellarium nostrum Angliae administrandi; (cui quidem Praesidi pro tempore existenti sacramenta praedictae administrare plenam potestatem et authoritatem pro nobis heredibus et successoribus nostris damus et concedimus per praesentes): Et quod eaedem personae sic, ut praefertur, ad Concilium praedictae Regalis Societatis electae praefectae et juratae, et in posterum eligendae praeficiendae et jurandae de tempore in tempus, erunt et existent auxiliantes consulentes et assistentes in omnibus materiis rebus et negotiis meliorem regulationem gubernationem et directionem praedictae Regalis Societatis, et cujuslibet Membri ejusdem, tangentibus seu concernentibus.

The President, Council, and Fellows, (of whom the President to be one), to elect, annually, on St. Andrew's Day, one out of the Council to be President; who is to hold, if not dead nor amoved, till the next St. Andrew's Day, and till another shall be chosen; having first taken the Oath, before the Council or seven or more of them.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod Praeses Concilium et Sodales Regalis Societatis praedictae pro tempore existentes (quorum Praesidem pro tempore existentem unum esse volumus) de tempore in tempus perpetuis futuris temporibus potestatem et authoritatem habeant et habebunt nominandi et eligendi, et quod eligere et nominare possint et valeant, quolibet anno in praedicto festo Sancti Andreae, unum de Concilio praedictae Regalis Societatis pro tempore existente, qui sit et erit Praeses Regalis Societatis praedictae usque ad festum Sancti Andreae Apostoli exinde proximum sequens (si tam diu vixerit, aut interim pro aliqua justa et rationabili causa non amotus fuerit) et exinde, quousque unus alius in officium Praesidis Regalis Societatis praedictae electus praefectus et nominatus fuerit; quodque ille, postquam sic, ut praefertur, electus et nominatus fuerit in officium Praesidis Regalis Societatis praedictae, antequam ad officium illud admittatur, sacramentum corporale coram Concilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum, ad officium illud recte bene et fideliter in omnibus officium illud tangentibus exequendum praestabit, secundùm formam et effectum praedicti sacramenti, mutatis mutandis; (cui quidem Concilio, aut aliquibus septem vel pluribus eorum, sacramentum praedictum administrare pro nobis heredibus et successoribus nostris plenam potestatem et authoritatem de tempore in tempus, quotiescunque necessarium fuerit, damus et concedimus per praesentes): et quod post hujusmodi sacramentum sic, ut

On the Death, or Amotion of a President, the Council and Fellows, or any seven or more of them, are to elect another, out of the Council: who is to hold, during the residue of the year, (being first sworn), and until another be chosen and sworn.

praefertur, praestitum, officium Praesidis Regalis Societatis praedictae usque ad festum Sancti Andreae Apostoli exinde proximum sequens exequi valeat et possit: Et si contigerit Praesidem Regalis Societatis praedictae pro tempore existentem, aliquo tempore quamdiu fuerit in officio Praesidis ejusdem Regalis Societatis, obire vel ab officio suo amoveri, quod tunc et toties bene liceat et licebit Concilio et Sodalibus praedictae Regalis Societatis, vel aliquibus septem vel pluribus eorum (quorum Praesidem[4] Concilii praedicti ad talem electionem semper unum esse volumus) alium de praedicto numero Concilii praedicti in Praesidem Regalis Societatis praedictae eligere et praeficere; et quod ille sic electus et praefectus officium illud habeat et exerceat durante residuo ejusdem anni, et quousque alius ad officium illud debito modo electus et juratus fuerit, sacramento corporali in forma ultimè specificata priùs praestando; et sic toties quoties casus sic acciderit.

If any of the Council die, or be amoved, or quit, (and power of amotion is here given to the President and Council or Major part of them, whereof the President to be one); the President, Council, and Fellows, or the Major part of them, (the President to be one), may supply the vacancy out of the Fellows: and the elected shall hold, (being first sworn), till the next St. Andrew's Day, and till another Election.

ET VLTERIVS volumus quod quandocunque contigerit aliquem vel aliquos de Concilio Regalis Societatis praedictae pro tempore existente mori, vel ab officio illo amoveri, vel decedere, (quos quidem de Concilio Regalis Societatis praedictae et eorum quemlibet pro male se gerendo aut aliqua alia rationabili causa amobiles esse volumus ad beneplacitum Praesidis et caeterorum de Concilio praedicto superviventium et in officio illo remanentium, vel majoris partis eorundem, quorum Praesidem pro tempore existentem unum esse volumus,) quod tunc et toties bene liceat et licebit praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae, vel majori parti eorundem (quorum Praesidem Regalis Societatis praedictae pro tempore existentem unum esse volumus) unum alium vel plures alios de Sodalibus Regalis Societatis praedictae, loco sive locis ipsius vel ipsorum sic mortuorum decedentium vel amotorum, ad supplendum praedictum numerum viginti et unius personarum de Concilio Regalis Societatis praedictae nominare eligere et praeficere; et quod ille sive illi sic in officio illo electi et praefecti idem[4] officium habeat et habeant usque ad festum Sancti Andreae Apostoli tunc proximum sequens, et exinde, quousque unus alius vel plures alii electus praefectus et nominatus fuerit, electi praefecti et nominati fuerint; sacramento corporali ad officium illud in omnibus et per omnia officium illud tangentia coram Praeside et Concilio Regalis Societatis praedictae, vel aliquibus septem vel pluribus eorum pro tempore existentibus, bene et fideliter exequendum, secundum veram intentionem praesentium, priùs praestando.

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[4] *Sic in* Authentic.

On every St. Andrew's day, ten (and no more) of the Council are to be changed.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis, quod ipsi et successores sui quolibet anno, in praedicto festo Sancti Andreae Apostoli, plenam potestatem et authoritatem habeant et habebunt eligendi nominandi praeficiendi et mutandi decem de Sodalibus Regalis Societatis praedictae, ad supplendum loca et officia decem praedicti numeri viginti et unius de Concilio Regalis Societatis praedictae; quoniam regiam voluntatem nostram esse declaramus, et per praesentes pro nobis heredibus et successoribus nostris concedimus, quod decem de Concilio praedicto, et non amplius, per Praesidem Concilium et Sodales Regalis Societatis praedictae annuatim mutati et amoti fuerint.

The President may appoint *one* out of the Council to be his Deputy:

Who may act as such during his Absence; unless he appoint some other out of the Council to be so.

Such Deputy may, in the President's Absence, do all Acts that he himself could do if present.

Volvmvs etiam, et pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis, quod si contigerit Praesidem ejusdem Regalis Societatis pro tempore existentem aegritudine vel infirmitate detineri, vel in servitio nostro heredum vel successorum nostrorum versari, vel aliter esse occupatum, ita quod necessariis negotiis ejusdem Regalis Societatis officium Praesidis tangentibus attendere non poterit; quod tunc et toties bene liceat et licebit eidem Praesidi sic detento versato vel occupato *unum* de Concilio praedictae Regalis Societatis pro tempore existente, fore et esse *Deputatum* ejusdem Praesidis, nominare et appunctuare; qui quidem Deputatus, in officio Deputati Praesidis praedicti sic faciendus et constituendus, sit et erit Deputatus ejusdem Praesidis de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante toto tempore, quo praedictus Praeses in officio Praesidis continuaverit; nisi interim praedictus Praeses Regalis Societatis praedictae pro tempore existens unum alium de praedicto Concilio ejus Deputatum fecerit et constituerit; et quod quilibet hujusmodi Deputatus praedicti Praesidis sic, ut praefertur, fiendus[5] et constituendus, omnia et singula, quae ad officium Praesidis praedictae Regalis Societatis pertinent seu pertinere debent, vel per praedictum Praesidem virtute harum Literarum nostrarum patentium limitata et appunctuata fore[6] facienda et exequenda de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante tali tempore, quo Deputatus praedicti Praesidis continuaverit, facere et exequi valeat et possit, vigore harum Literarum nostrarum patentium, adeo plene libere et integre, ac in tam amplis modo et forma, prout Praeses praedictus, si praesens esset, illa facere et exequi valeret et posset; sacramento corporali super sancta Dei Evangelia in forma et effectu ultime specificatis per hujusmodi Deputatum ad omnia et singula, quae ad officium Praesidis pertinent, bene et fideliter exequendum, coram praefato Concilio praedictae Regalis Societatis, vel aliquibus septem vel pluribus eorum, prius praestando; et sic toties quoties casus sic acciderit: cui quidem Concilio vel aliquibus septem vel pluribus eorum pro tempore existentibus, sacramentum praedictum administrare potestatem et authoritatem, quoties casus sic acciderit, damus et concedimus per praesentes, absque aliquo brevi commissione sive ulteriori warranto in ea parte a nobis heredibus vel successoribus nostris procurando seu obtinendo.

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[5] *Sic in* Authentic.

But he must first be sworn before the Council, or seven or more of them.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod ipsi et successores sui de caetero in perpetuum habeant et habebunt unum Thesaurarium, duos Secretarios, unum Clericum, et duos Servientes ad clavas qui de tempore in tempus super Praesidem attendant; quodque praedicti Thesaurarius Secretarii Clericus et Servientes ad clavas eligendi et nominandi, antequam ad officia sua separalia et respectiva exequendum admittantur, sacramenta sua corporalia in forma et effectu ultime specificatis, coram Praeside et Concilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum, officia sua separalia et respectiva in omnibus illa tangentibus recte bene et fideliter exequendum praestabunt; et quod post hujusmodi sacramenta sic, ut praefertur, praestita officia sua respectiva exerceant et utantur; quibus quidem Praesidi et Concilio, aut aliquibus septem vel pluribus eorum, sacramenta praedicta de

The President, Council, and Fellows, may have one Treasurer, two Secretaries, a Clerk, and two Serjeants at Mace:

Who are all to be sworn before the President and Council, or any seven or more of them.

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[6] *Sic in* Authentic.

tempore in tempus administrare praedictis separalibus et respectivis officiariis et successoribus suis plenam potestatem et authoritatem damus et concedimus per praesentes; et assignavimus nominavimus eligimus creavimus constituimus et fecimus, ac per praesentes pro nobis heredibus et successoribus nostris assignamus nominamus eligimus creamus constituimus et facimus, dilectos subditos nostros Willielmum *Balle* Armigerum fore et esse primum et modernum Thesaurarium; et praedictum[7] Johannem *Wilkins* et Henricum *Oldenburg* fore et esse primos et modernos Secretarios praedictae Regalis Societatis; continuandos in eisdem officiis usque ad praedictum festum Sancti Andreae Apostoli proximùm sequens post datum praesentium: Quodque de tempore in tempus et ad omnia tempora, in praedicto festo Sancti Andreae Apostoli (si non fuerit dies Dominicus, et si fuerit dies Dominicus, tunc die proxime sequenti) Praeses Concilium et Sodales praedictae Regalis Societatis pro tempore existentes, aut major pars eorundem (quorum Praesidem pro tempore existentem unum esse volumus) alios probos et discretos viros, de tempore in tempus, in Thesaurarium, Secretarios, Clericum, et Servientes ad clavas praedictae Regalis Societatis, eligere nominare et praeficere valeant et possint; quodque illi, qui in separalia et respectiva officia praedicta sic, ut praefertur, electi praefecti et jurati fuerint, officia illa respectiva exercere et gaudere possint et valeant usque ad praedictum festum Sancti Andreae extunc proximùm sequens, sacramentis suis praedictis sic, ut praefertur, prius praestandis; et sic toties quoties casus sic acciderit; et si contigerit aliquem vel aliquos officiariorum praedictorum ejusdem Regalis Societatis obire, vel ab officiis suis respectivis amoveri, quod tunc et toties bene liceat et licebit Praesidi Concilio et Sodalibus praedictae Regalis Societatis, vel majori parti eorundem (quorum Praesidem pro tempore existentem unum esse volumus) alium vel alios in officium sive officia illarum personarum sic defunctarum sive amotarum eligere et praeficere; et quod ille sive illi sic electus et praefectus electi et praefecti officia praedicta respectiva habeat et exerceat habeant et exerceant durante residuo ejusdem anni, et quousque alius sive alii ad officia illa respectiva debito modo electus et juratus fuerit, electi et jurati fuerint; et sic toties quoties casus sic acciderit.

William Balle appointed Treasurer, John Wilkins and Henry Oldenburg Secretaries.

And on every St. Andrew's day yearly, (unless it be Sunday,) the President, Council, and Fellows, or the major Part of them (of whom the President to be one), are to elect others in the Offices of Treasurer, Secretaries, Clerk, and Serjeants at Mace; who, after being sworn, are to officiate till the next St. Andrew's Day.

And if any of them die or be amoved, the like Election to be made of others to supply their Places, for the Residue of the Year, and till others shall be duly elected and sworn.

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[7] *Sic in* Authentic.

The President and Council, and the major Part of them (of whom the President to be one), may meet in a College or other public Place or Hall in London, or within ten Miles of it; and make Laws, Statutes, and Ordinances, and do all other Things relating to the Affairs of the Society.

Et insvper volumus, ac de gratia nostra speciali ac ex certa scientia et mero motu nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod Praeses et Concilium praedictae Regalis Societatis pro tempore existentes, et major pars eorundem (quorum Praesidem pro tempore existentem unum esse volumus) pariter congregare et assemblare possint et valeant in collegio sive alio publico loco sive aula intra civitatem nostram *London*, vel in aliquo alio loco conveniente intra decem milliaria ejusdem civitatis nostrae; et quod ipsi sic congregati et assemblati habebunt et habeant plenam authoritatem potestatem et facultatem de tempore in tempus condendi constituendi ordinandi faciendi et stabiliendi hujusmodi leges statuta jura ordinationes et constitutiones, quae eis, aut eorum majori parti, bona salubria utilia honesta et necessaria juxta eorum sanas discretiones fore videbuntur, et omnia quaecunque alia negotiis et rebus Regalis Societatis praedictae spectantia[8] agendi et faciendi; quae omnia et singula leges statuta jura ordinationes et constitutiones sic ut praefertur facienda volumus, et per praesentes pro nobis heredibus et successoribus nostris firmiter injungendo praecipimus et mandamus, quod de tempore in tempus inviolabiliter observata fuerint, secundùm tenorem et effectum eorundem: Ita tamen, quod praedicta leges statuta jura ordinationes et constitutiones sic ut praefertur facienda, et eorum quaelibet, sint rationabilia, et non sint repugnantia nec contraria legibus consuetudinibus juribus sive statutis hujus regni nostri Angliae.

Power is given to the Council and Fellows, to appoint one or more Printer or Printers, and one or more Engraver or Engravers; and to authorize them, by writing under the common Seal, and signed by the President, to print such Things (touching or concerning the Society) as shall be given them in Charge by the President and Council, or any seven or more of them (of whom the President to be one.)

Et vlterivs de ampliori gratia nostra speciali ac ex certa scientia et mero motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus notris damus et concedimus praefatis Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis, plenam potestatem et authoritatem de tempore in tempus eligendi nominandi et constituendi unum vel plures Typographos sive Impressores, et Chalcographos seu Sculptores; et ipsi vel ipsis per scriptum communi Sigillo praedictae Regalis Societatis sigillatum, et manu Praesidis pro tempore existentis signatum, facultatem concedendi, ut imprimant talia res materias et negotia praedictam Societatem tangentia vel concernentia, qualia praedictis

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[8] *Sic in* Authentic.

Typographo vel Impressori, Chalcographo vel Sculptori, vel Typographis vel Impressoribus, Chalcographis vel Sculptoribus, de tempore in tempus per Praesidem et Concilium praedictae Regalis Societatis, vel aliquos septem vel plures eorum (quorum Praesidem pro tempore existentem unum esse volumus) commissa fuerint; sacramentis suis corporalibus, antequam ad officia sua exercendum admittantur, coram Praeside et Concilio pro tempore existentibus, vel aliquibus septem vel pluribus eorum, in forma et effectu ultime specificatis, prius praestandis: quibus quidem Praesidi et Concilio, vel aliquibus septem vel pluribus eorum, sacramenta praedictae administrare plenam potestatem et authoritatem damus et concedimus per praesentes.

They must be first sworn before the President and Council, or any seven or more of them.

Et vlterivs, quod praedicti Praeses Concilium et Sodales praedictae Regalis Societatis in philosophicis suis studiis meliorem sortiantur effectum, de ampliori gratia nostra speciali ac ex certa scientia et mere motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus, praedictis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis, quod ipsi et successores sui de tempore in tempus habeant et habebunt plenam potestatem et authoritatem de tempore in tempus, et ad talia tempestiva tempora, secundum eorum discretionem, requirere capere et recipere cadavera talium personarum, quae mortem manu carnificis passae fuerunt, et ea anatomizare, in tam amplis modo et forma, et ad omnes intentiones et proposita, prout Collegium Medicorum et Corporatio Chirurgorum civitatis nostrae *London* eisdem cadaveribus usi vel gavisi fuerunt, aut uti vel guadere valeant et possint.

The same Right to demand, receive, and anatomize the Bodies of executed Criminals, is given to this Society, as the College of Physicians and the Corporation of Surgeons of London have or use.

Et vlterivs, pro melioratione experimentorum artium et scientiarum praedictae Regalis Societatis, de abundantiori gratia nostra speciali ac ex certa scientia et mero motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis, quod ipsi et successores sui de tempore in tempus habeant et habebunt plenam potestatem et authoritatem, per literas vel epistolas, sub manu praedicti Praesidis in praesentia Concilii, *vel aliquorum septem vel plurium eorum*, et in nomine Regalis Societatis, ac communi Sigillo suo praedicto

Licence to hold a Literary Correspondence, on Philosophical, Mathematical, or Mechanical Subjects, with all Sorts of Foreigners; by Letters sealed with the common Seal of the Society, and signed by the President in the Presence of the Council or any seven or more of them.

sigillatis, mutuis intelligentiis fruentur[9], et notitiis cum omnibus et omnimodis personis peregrinis et alienis, utrum privatis vel collegiatis, corporatis vel politicis, absque aliqua molestatione interruptione vel inquietatione quacunque: PROVISO tamen, quod haec indulgentia nostra sic ut praefertur concessa ad ulteriorem non extendatur usum, quam particulare beneficium et interesse praedictae Regalis Societatis in materiis seu rebus philosophicis mathematicis aut mechanicis.

Licence to build a College or Colleges in London, or within ten Miles of London.

ET VLTERIVS dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis plenam potestatem et authoritatem erigendi aedificandi et extruendi, aut erigi aedificari et extrui faciendi vel causandi, intra civitatem nostram *London*, vel decem milliaria ejusdem, unum vel plura Collegium vel Collegia cujuscunque modi vel qualitatis, pro habitatione assemblatione et congregatione praedictorum Praesidis Concilii et Sodalium praedictae Regalis Societatis et successorum suorum, negotia sua et alias res eandem Regalem Societatem concernentia ad ordinandum et disponendum.

If any Abuses or Dissensions arise, they shall be reformed and settled by the Lord Chancellor Clarendon alone, if living; afterwards by the Archbishop of Canterbury, the Lord Chancellor, or Keeper, the Lord Treasurer, the Bishop of London, the Lord Privy Seal, and the two Secretaries of State for the Time being, or four or more of them.

ET VLTERIVS volumus, ac per praesentes pro nobis heredibus et successoribus nostris ordinamus constituimus et appunctuamus, quod si aliqui abusus vel discrepantiae in posterum orientur et accident de gubernatione aut aliis rebus vel negotiis praedictae Regalis Societatis, unde ejusdem constitutioni stabilimini et studiorum progressui vel rebus et negotiis aliqua inferatur injuria vel impedimentum; quod tunc et toties per praesentes pro nobis heredibus et successoribus nostris authorizamus nominamus assignamus et constituimus praefatum praedilectum et perquam fidelem consanguineum et consiliarium nostrum Edwardum Comitem *Clarendon* Cancellarium nostrum regni nostri Angliae, per seipsum durante vita sua, et post ejus mortem tunc Archiepiscopum Cantuariensem, Cancellarium vel Custodem magni Sigilli Angliae, Thesaurarium Angliae, Episcopum Londinensem, Custodem privati Sigilli, et duos principales Secretarios, pro tempore existentes, aut aliquos quatuor vel plures eorum, easdem discrepantias et abusus reconciliare componere et reducere.

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[9] *Sic in* Authentic.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris firmiter injungendo praecipimus et mandamus omnibus et singulis Iusticiariis, Majoribus, Aldermannis, Vicecomitibus, Ballivis, Constabulariis, et aliis officiariis ministris et subditis nostris heredum et successorum nostorum quibuscunque, quòd de tempore in tempus sint auxiliantes et assistentes praedictis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis in omnibus et per omnia, secundum veram intentionem harum Literarum nostrarum patentium.

General Clauses.

Eo, quod expressa mentio de vero valore annuo, vel de certitudine praemissorum sive eorum alicujus, aut de aliis donis sive concessionibus per nos seu per aliquem progenitorum sive praedecessorum nostrorum, praefatis Praesidi Concilio et Sodalibus Regalis Societatis ante haec tempora factis, in praesentibus minime facta existit, aut aliquo statuto actu ordinatione provisione proclamatione sive restrictione in contrarium inde antehac habitis factis editis ordinatis sive provisis, aut aliqua alia re causa vel materia quacunque, in aliquo non obstante.

In cvivs rei testimonium has Literas nostras fieri fecimus patentes. Teste Me ipso apud Westmonasterium, quinto decimo die Iulii, anno regni nostri decimo quarto[10].

Per ipsum Regem.

HOWARD.

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[10] This document, with those of a similar nature, subsequently granted to the Society, are preserved in a strong box in the apartments of the Royal Society. The first Charter is on four sheets of Vellum; it was drawn by Sir Robert Sawyer, then Attorney-General, and is remarkable for its clearness and legal terseness;—the first sheet contains some remarkably handsome ornamented capitals and flowers, with a finely executed Portrait of Charles II. in Indian ink within the initial letter C. The Great Seal of the Kingdom in green wax is appended to the Charter.

II.

CHARTA SECUNDA,

Iisdem ab eodem concessa, *A. D.* MDCLXIII.

CAROLVS SECVNDVS Dei gratia Angliae Scotiae Franciae et Hiberniae Rex, fidei Defensor, etc. omnibus ad quos hae Literae nostrae patentes pervenerint, salutem.

DIV multumque apud nos statuimus, ut imperii fines, sic etiam artes atque scientias ipsas promovere. Favemus itaque omnibus disciplinis: particulari autem gratia indulgemus philosophicis studiis; praesertim iis, quae solidis experimentis conantur aut novam extundere philosophiam, aut expolire veterem. Vt igitur inclarescant apud nostros hujusmodi studia, quae nusquam terrarum adhuc satis emicuerunt; utque nos tandem universus literarum orbis non solum fidei defensorem, sed etiam veritatis omnimodae et cultorem ubique et patronum semper agnoscat.

Incorporation and Corporate Name.

The King himself Founder and Patron.

SCIATIS, quod nos de gratia nostra speciali ac ex certa scientia et mero motu nostris ordinavimus constituimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris ordinamus constituimus et concedimus, quod de caetero in perpetuum erit Societas de Praeside Concilio et Sodalibus consistens, qui vocabuntur et nuncupabuntur *Praeses Concilium et Sodales Regalis Societatis Londini pro scientia naturali promovenda;* (cujus quidem Societatis nos ipsos Fundatorem et Patronum per praesentes declaramus;) Et eandem Societatem, per nomen *Praesidis Concilii et Sodalium Regalis Societatis Londini pro scientia naturali promovenda*, unum corpus corporatum et politicum in re facto et nomine realiter et ad plenum pro nobis heredibus et successoribus nostris facimus ordinamus creamus et constituimus per praesentes, et quod per idem nomen habeant successionem perpetuam; Et quod ipsi et eorum successores (quorum studia ad rerum naturalium artiumque utilium scientias experimentorum fide ulteriùs promovendas, in Dei Creatoris gloriam et generis humani commodum, applicanda sunt,) per idem nomen *Praesidis Concilii et Sodalium Regalis Societatis Londoni pro scientia na-*

turali promovenda, sint et erunt perpetuis futuris temporibus personae habiles et in lege capaces ad habendum perquirendum percipiendum et possidendum terras tenementa prata pascua pasturas libertates privilegia franchesias jurisdictiones et hereditamenta quaecunque sibi et successoribus suis in feodo et perpetuitate, vel pro termino vitae vitarum vel annorum, seu aliter quocunque modo, ac etiam bona et catalla ac omnes alias res cujuscunque fuerint generis naturae speciei sive qualitatis (statuto *De alienatione in manum mortuam* non obstante;) necnon ad dandum concedendum et assignandum eadem terras tenementa et hereditamenta bona et catalla, et omnia facta et res necessarias faciendum et exequendum de et concernentia eadem, per nomen praedictum; Et quod per nomen *Praesidis Concilii et Sodalium Regalis Societatis Londini pro scientia naturali promovenda* praedictum, placitare et implacitari, respondere et responderi, defendere et defendi, de caetero in perpetuum valeant et possint, in quibuscunque curiis placeis et locis, et coram quibuscunque Iudicibus et Iusticiariis et aliis personis et officiariis nostris heredum et successorum nostrorum, in omnibus et singulis actionibus, tum realibus tum personalibus, placitis sectis querelis causis materiis rebus et demandis quibuscunque, cujuscunque sint aut erunt generis naturae vel speciei; eisdem modo et forma, prout aliqui ligei nostri intra hos regnum nostrum Angliae, personae habiles et in lege capaces, aut ut aliquod corpus corporatum vel politicum intra hoc regnum nostrum Angliae, habere perquirere recipere possidere dare et concedere, placitare et implacitari, respondere et responderi, defendere vel defendi, valeant et possint, valeat et possit: Et quod iidem Praeses Concilium et Sodales Regalis Societatis praedictae et successores sui habeant in perpetuum commune Sigillum, pro causis et negotiis suis et successorum suorum quibuscunque agendis deserviturum; et quod bene liceat et licebit eisdem Praesidi Concilio et Sodalibus Regalis Societatis praedictae, et successoribus suis pro tempore existentibus, Sigillum illud de tempore in tempus frangere mutare et de novo facere, prout eis melius fore videbitur expediri.

Capacity to purchase;

and to grant;

and to sue and be sued;

and to have a common Seal; (which they have Liberty to alter at pleasure.)

DAMVS insuper et concedimus per praesentes Praesidi Concilio et Sodalibus Regalis Societatis praedictae eorumque in perpetuum successoribus, in favoris nostri regii erga ipsos nostraeque de ipsis peculiaris existimationis praesenti et futuris aetatibus testimonium, haec honoris insignia sequentia, viz.

Grant of Arms, viz. Argent; in a Canton Dexter, the three Lions of England: and also of a Crest, and Supporters.

In Parmae argenteae angulo dextro tres leones nostros Anglicos; et pro Crista galeam corona flosculis interstincta adornatam, cui supereminet aquila nativi coloris, altero pede scutum leonibus nostris insignitum tenens; Telamones scutarios, duos canes sagaces albos, colla coronis cinctos (prout in margine luculentius videre est[1]) a praedictis Praeside Concilio et Sodalibus ipsorumque sucessoribus, prout feret occasio, in perpetuum gestanda producenda possidenda.

The Council shall consist of Twenty-one: (of whom, the President or his Deputy shall be always one.)

Et, quod intentio nostra regia meliorem sortiatur effectum, ac pro bono regimine et gubernatione praedictae Regalis Societatis de tempore in tempus, VOLVMVS, ac per praesentes pro nobis heredibus et successoribus nostris concedimus eisdem Praesidi Concilio et Sodalibus Societatis Regalis praedictae et successoribus suis, quod de caetero in perpetuum Concilium praedictum erit et consistet ex viginti et una personis (quarum Praesidem pro tempore existentem, vel ejus Deputatum, semper unum esse volumus;) Et quod omnes et singulae aliae personae, quae intra duos menses proximè sequentes post datum praesentium, per Praesidem et Concilium vel per aliquos undecim vel plures eorum (quorum Praesidem pro tempore existentem vel ejus Deputatum semper unum esse volumus,) vel per duas tertias partes vel plures praedictorum undecim vel plurium, et in omni tempore sequenti per Praesidem Concilium et Sodales, sive per aliquos viginti et unum vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, semper unum esse volumus) sive per duas tertias partes vel plures praedictorum viginti et unius vel plurium, in eandem Societatem accipientur et admittentur ut Membra Regalis Societatis praedictae, et in Registro per ipsos conservando annotatae fuerint, erunt vocabuntur et nuncupabuntur *Sodales Regalis Societatis* praedictae, quamdiu vixerint, nisi ob causam aliquam rationabilem, secundum Statuta Regalis Societatis praedictae condenda, quemvis eorum amoveri contigerit: quos quanto eminentiùs omnis generis doctrinae bonarumque literarum studio clarescant, quanto ardentiùs hujusce Societatis honorem studia et emolumentum promoveri cupiant, quanto vitae integritate morumque probitate ac pietate emineant, et fidelitate animique erga nos coronam et dignitatem nostram sincero affectu polleant, eo magis idoneos et dignos, qui in

All other Persons who shall be received and admitted as Members, by the President and Council, or any eleven or more of them (of whom, &c.) or by two Thirds or more of those eleven or more *within* two Months; and at all Times *after* those two Months; by the President, Council, and *Fellows*, or by any twenty-one or more of them (of whom the President or his Deputy to be one,) or by *two third* Parts or more of the said twenty-one or more; and shall be registered; shall be called *Fellows* of the said Royal Society, for Life, unless regularly amoved.

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[1] A representation of the Arms appears on the first sheet of the Charter.

Sodalium ejusdem Societatis numerum adsciscantur, omnino censeri volumus.

Et, pro meliori executione voluntatis et concessionis nostrae in hac parte, ASSIGNAVIMVS nominavimus constituimus et fecimus, ac per praesentes pro nobis heredibus et successoribus nostris assignamus nominamus constituimus et facimus, praedilectum et fidelum nobis Willielmum Vicecomitem *Brouncker*, Cancellarium praecharissimae consortis nostrae Reginae Catharinae, esse primum et modernum Praesidem Regalis Societatis praedictae; volentes quod praedictus Willielmus Vicecomes *Brouncker* in officio Praesidis Regalis Societatis praedictae, a datu praesentium usque ad festum Sancti Andreae proximùm sequentem[2] post datum praesentium, continuabit, et quousque unus alius de Concilio Regalis Societatis praedictae pro tempore existente ad officium illud debito modo electus praefectus et juratus fuerit, juxta ordinationem et provisionem in his praesentibus inferius expressam et declaratam, (si praedictus Willielmus Vicecomes *Brouncker* tam diu vixerit;) sacramento corporali, in omnibus et per omnia officium illud tangentia, bene et fideliter exequendum, secundum veram intentionem harum praesentium, coram praedilecto et perquam fideli consanguineo et consiliario nostro Edwardo Comite *Clarendon* Cancellario nostro Angliae priùs praestito, (cui quidem Edwardo Comiti *Clarendon* Cancellario nostro praedicto sacramentum praedictum administrare plenam potestatem et authoritatem damus et concedimus,) in haec verba sequentia, viz.

William Lord Viscount Brouncker, named to be the first President; to continue so till the next St. Andrew's Day, and till another (out of the Council) should be chosen and sworn.

He himself to be first sworn in before the Lord Chancellor.

I WILLIAM VISCOUNT BROUNCKER *doe promise to deale faithfully and honestly in all things belonging to the trust committed to me, as President of the Royall Society of London for improving naturall knowledge, dureing my employment in that capacity: So help me God!*

The President's Oath.

ASSIGNAVIMVS etiam constituimus et fecimus, ac per praesentes pro nobis heredibus et successoribus nostris facimus, dilectos nobis et fideles Robertum *Moray* Militem unum a secretioribus nostris conciliis in regno nostro Scotiae, Robertum *Boyle* Armigerum, Willielmum *Brereton* Armigerum filium primogenitum Baronis de *Brereton*, Kenelmum *Digby* Militem praecharissimae matri nostrae Mariae Reginae Cancel-

The first Council named.

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[2] *Sic in* Authentic. *et aliquoties infra.*

larium, Gilbertum *Talbot*[3] Militem jocalium nostrorum Thesaurarium, Paulum *Neile* Militem unum Ostiariorum camerae privatae nostrae, Henricum *Slingesby* Armigerum unum Generosorum praedictae privatae camerae nostrae, Willielmum *Petty* Militem, Timotheum *Clarke* in medicinis Doctorem et unum Medicorum nostrorum, Iohannem *Wilkins* in theologia Doctorem, Georgium *Ent* in medicinis Doctorem, Willielmum *Aerskine* unum a poculis nostris, Ionathan. *Goddard* in medicinis Doctorem et Professorem Collegii de *Gresham*, Willielmum *Balle* Armigerum, Matthaeum *Wren* Armigerum, Iohannem *Evelyn* Armigerum, Thomam *Henshaw* Armigerum, *Dudley Palmer* de *Greys Inn* in comitatu nostro Middlesexiae Armigerum, Abrahamum[4] *Hill* de *London* Armigerum, et *Henricum Oldenburg* Armigerum, unà cum Praeside praedicto, fore et esse primos et modernos viginti et unum de Concilio et Sodalibus Regalis Societatis praedictae; continuandos in officiis Concilii praedicti à datu praesentium usque ad praedictum festum Sancti Andreae Apostoli proximum sequentem, et deinde, quousque aliae idonae personae et habiles et sufficientes in officia praedicta electae praefectae et juratae fuerint (si tam diu vixerint, aut pro aliqua justa et rationabili causa non amotae fuerint[4];) sacramentis corporalibus coram Praeside pro tempore existente praedictae Regalis Societatis, ad officia sua bene et fideliter in omnibus et per omnia officia illa tangentia exequendum, priùs praestandis, secundum formam et effectum praedicti sacramenti, mutatis mutandis, Praesidi Regalis Societatis praedictae per Cancellarium nostrum Angliae administrandi; (cui quidem Praesidi pro tempore existenti sacramenta praedicta administrare personis praedictis, et aliis quibuscunque in posterum de tempore in tempus in Concilium praedictum eligendis, plenam potestatem et authoritatem pro nobis heredibus et successoribus nostris damus et concedimus per praesentes;) Et quod eaedem personae sic, ut praefertur, ad Concilium praedictae Regalis Societatis electae praefectae et juratae, et in posterum eligendae praeficiendae et jurandae de tempore in tempus, erunt et existent auxiliantes consulentes et assistentes in omnibus materiis rebus et negotiis meliores[4]

To continue till next St. Andrew's Day, and till others shall be elected and sworn, unless amoved for just Cause; having first taken, before the President, the like Oath as he took, mutatis mutandis.

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[3] Sir *Gilbert Talbot* and Mr. *Hill* were not in the first Charter: They supply the vacancies of Dr. *Wallis* and Dr. *Wren*.

[4] *Sic in* Authentic.

regulationem gubernationem et directionem praedictae Regalis Societatis, et cujuslibet Membri ejusdem, tangentibus seu concernentibus.

The President, Council, and Fellows, or any nine or more of them (of whom, &c.) may hold Assemblies at any Time or Place in London, or within ten Miles of it.

Concedimus etiam Praesidi Concilio et Sodalibus Societatis praedictae et eorum in perpetuum successoribus, quod ipsi et successores eorum, seu aliqui novem vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, semper unum esse volumus) conventus seu congregationes de seipsis pro experimentorum et rerum naturalium cognitione et indagine aliisque negotiis ad Societatem praedictam spectantibus, quoties et quando opus fuerit, licite facere et habere possint in collegio sive aula sive alio loco commodo intra civitatem nostram Londini, vel aliquo alio loco commodo intra decem milliaria ab eadem civitate nostra.

The President, Council, and Fellows, or any thirty-one or more of them (of whom the President or his Deputy to be one) or the major part of such thirty-one or more, may upon every St. Andrew's Day, annually, elect one of the Council to be their President, who shall continue so, (if not dead or amoved,) till the next St. Andrew's Day, and till another shall be elected; having first been sworn in before the Council, or any seven or more of them.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod Praeses Concilium et Sodales Regalis Societatis praedictae pro tempore existentes, sive aliqui triginta et unus vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) seu major pars praedictorum triginta et unius vel plurium, de tempore in tempus perpetuis futuris temporibus potestatem et authoritatem habeant et habebunt nominandi et eligendi, et quod eligere et nominare possint et valeant, quolibet anno in praedicto festo Sancti Andreae, unum de Concilio praedictae Regalis Societatis pro tempore existente, qui sit et erit Praeses Regalis Societatis praedictae usque ad festum Sancti Andreae Apostoli exinde proximum sequentem (si tam diu vixerit, aut interim pro aliqua justa et rationabili causa non amotus fuerit,) et exinde quousque unus alius in officium Praesidis Regalis Societatis praedictae electus praefectus et nominatus fuerit; quodque ille postquam sic ut praefertur electus et nominatus fuerit in officium Praesidis Regalis Societatis praedictae, antequam ad officium illud admittatur sacramentum corporale coram Concilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum, ad officium illud recte bene et fideliter in omnibus officium illud tangentibus exequendum praestabit, secundum formam et effectum praedicti sacramenti, mutatis mutandis; (cui quidem Concilio aut aliquibus septem vel pluribus eorum, sacramentum praedictum administrare, pro nobis heredibus et successoribus nostris, plenam potestatem et authoritatem de tempore in tempus, quotiescunque Praesidem eligere opus fuerit, damus et concedimus per praesentes;) et quod post hujusmodi sacramentum sic ut praefertur praestitum, officium Praesidis Regalis Societatis praedictae usque ad festum Sancti Andreae Apostoli exinde proximum sequentem exequi valeat et possit: Et si contigerit Praesidem Regalis Societatis praedictae pro tempore existentem aliquo tempore, quamdiu fuerit in officio Praesidis ejusdem Regalis Societatis, obire, decedere, vel ab officio suo amoveri; quod tunc et toties bene liceat et licebit Concilio Regalis Societatis praedictae eorumque in perpetuum successoribus, sive aliquibus undecim vel pluribus eorum, convenire vel congregari ad eligendum unum de praedicto numero Concilii praedicti in Praesidem Regalis Societatis praedictae; et quod ille, qui per Concilium praedictum, vel per praedictos undecim vel plures, vel per majorem partem praedictorum undecim et plurium, electus fuerit et juratus, ut praefertur, officium illud habeat et exerceat durante residuo ejusdem anni, et quousque alius ad officium illud debito modo electus et juratus fuerit, sacramento corporali in forma supra specificata priùs praestando; et sic toties quoties casus sic acciderit.

On the Death or Amotion of a President, or if he quit, the Council or any eleven or more of them may meet to choose a President out of the Council: and the Person chosen by them, or the major part of them, being sworn, shall hold during the Residue of the Year, and until another shall be elected and sworn.

ET VLTERIVS volumus, quod quandocunque contigerit aliquem vel aliquos de Concilio Regalis Societatis praedictae pro tempore existente mori, vel ab officio illo amoveri, vel decedere; quos quidem de Concilio Regalis Societatis praedictae et eorum quemlibet pro male se gerendis aut aliqua alia rationabili causa amobiles esse volumus, ad beneplacitum Praesidis et caeterorum de Concilio praedicto (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) vel majoris partis eorundem; quod tunc et toties bene liceat et licebit praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae eorumque in perpetuum successoribus, vel aliquibus viginti uni vel pluribus eorundem (quorum Praesidem Regalis Societatis praedictae pro tempore existentem, vel ejus Deputatum, unum esse volumus) vel majori parti praedictorum viginti et unius vel plurium, unum alium vel plures alios de Sodalibus Regalis Societatis praedictae, loco sive locis ipsius vel ipsorum sic mortuorum decedentium vel amotorum, ad supplendum praedictum numerum viginti et unius personarum de Concilio Regalis Societatis praedictae nominare eligere et praeficere; et quod ille sive illi sic in officio illo electi et prae-

On the Death, Amotion, or quitting of any of the Council, (who are hereby made amoveable by the President and Council for sufficient Cause,) the President, Council, and Fellows, or any twenty-one or more of them (of whom, &c.) or the major part of such twenty-one or more, may supply the Vacancy from amongst the Fellows: And the Person or Persons elected shall hold, (being first sworn,) till the next St. Andrew's Day, and until another or others shall be elected.

fecti idem officium habeat et habeant usque ad festum Sancti Andreae Apostoli tunc proximum sequentem, et exinde quousque unus alius vel plures alii electus praefectus et nominatus fuerit, electi praefecti et nominati fuerint; sacramento corporali ad officium illud in omnibus et per omnia officium illud tangentia, coram Praeside et Concilio Regalis Societatis praedictae, vel aliquibus septem vel pluribus eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, semper unum esse volumus,) bene et fideliter exequendum, secundum veram intentionem praesentium, prius praestando.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis, quod ipsi et successores sui, sive aliqui triginta et unus vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, semper unum esse volumus) sive major pars praedictorum triginta et unius vel plurium quolibet anno, in praedicto festo Sancti Andreae Apostoli, plenam potestatem et authoritatem habeant et habebunt eligendi nominandi praeficiendi et mutandi decem de Sodalibus Regalis Societatis praedictae, ad supplendum loca et officia decem praedicti numeri viginti et unius de Concilio Regalis Societatis praedictae; quoniam regiam voluntatem nostram esse declaramus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus, quod decem de Concilio praedicto, et non amplius, per Praesidem Concilium et Sodales Regalis Societatis praedictae annuatim mutati et amoti fuerint.

On St. Andrew's Day, *Ten* of the Council (but no more) are to be changed by the President, Council, and Fellows, or any thirty-one or more of them (of whom the President or his Deputy always to be one,) or the major part of such thirty-one or more.

Volvmvs etiam, et pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis, et successoribus suis in perpetuum, quod si contigerit Praesidem ejusdem Regalis Societatis pro tempore existentem aegritudine vel infirmitate detineri, vel in servitio nostro heredum vel successorum nostrorum versari, vel aliter esse occupatum, ita quod necessariis negotiis ejusdem Regalis Societatis officium Praesidis tangentibus attendere non poterit, quod tunc et toties bene liceat et licebit eidem Praesidi sic detento versato vel occupato, *unum* de Concilio praedictae Regalis Societatis pro tempore existente, fore et esse *Deputatum* ejusdem Praesidis, nominare et appunctuare; qui quidem Deputatus, in officio Deputati Praesidis praedicti sic faciendus et constituendus sit et erit Deputatus ejusdem Praesidis, de tempore in tempus, toties quoties

The President may appoint *One* out of the Council to be his Deputy;

Who may act as such in his Absence, unless the President make some other Deputy out of the Council.

The Deputy may, in the Absence of the President, do all Acts that he himself could do if present.

praedictus Praeses sic abesse contigerit, durante toto tempore, quo praedictus Praeses in officio Praesidis continuaverit; *nisi* interim praedictus Praeses Regalis Societatis praedictae pro tempore existens unum alium de praedicto Concilio ejus Deputatum fecerit et constituerit; Et quod quilibet hujusmodi Deputatus praedicti Praesidis, sic ut praefertur faciendus et constituendus, omnia et singula, quae ad officium Praesidis praedictae Regalis Societatis pertinent seu pertinere debent, vel per praedictum Praesidem virtute harum Literarum nostrarum patentium limitata et appunctuata fore[5] facienda et exequenda, de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante tali tempore, quo Deputatus praedicti Praesidis continuaverit, facere et exequi valeat et possit, vigore harum Literarum nostrarum patentium, adeo plene libere et integre, ac in tam amplis modo et forma, prout Praeses praedictus, si praesens esset, illa facere et exequi valeret et posset; sacramento corporali supra sancta Dei Evangelia in forma et effectu supra specificatis per hujusmodi Deputatum, ad omnia et singula, quae ad officium Praesidis pertinent bene et fideliter exequendum, coram praefato Concilio praedictae Regalis Societatis, vel aliquibus septem[6] vel pluribus eorum, prius praestando; et sic toties quoties casus sic acciderit; cui quidem Concilio vel aliquibus septem vel pluribus eorum pro tempore existente[7], sacramentum praedictum administrare potestatem et authoritatem, quoties casus sic acciderit, damus et concedimus per praesentes, absque brevi commissione sive ulteriori warranto in ea parte a nobis heredibus vel successoribus nostris procurando seu obtinendo.

But he must first be sworn before the Council, or seven or more of them.

The Society may have a Treasurer, two Secretaries, two or more Curators of Experiments, one Clerk or more, and two Serjeants at Mace to attend upon the President. All these are to be chosen and named by the President, Council, and Fellows, or any thirty-one or more of them, (of whom the President or

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod ipsi et successores sui de caetero in perpetuum habeant et habebunt unum Thesaurarium, duos Secretarios, Curatores experimentorum duos vel plures, Clericum unum vel plures, et praeterea duos Servientes ad clavas qui de tempore in tempus super Praesidem attendant: quodque praedicti Thesaurarius Secretarii Curatores Clericus vel Clerici et Servientes ad clavas per Praesidem Concilium et Sodales Regalis Societatis praedictae, sive per aliquos triginta et unum vel plures eorum (quorum praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) vel per majorem partem praedictorum triginta et unius vel plurium, eligendi et nominandi, antequam ad officia sua specialia et respectiva exequendum admittantur, sacramenta sua corporalia in forma et effectu supra specificatis, coram Praeside vel ejus Deputato, et Concilio ejusdem Regalis Societatis, aut aliquibus septem vel pluribus eorum, officia sua separalia et respectiva in omnibus illa tangentibus recte bene et fideliter exequendum praestabunt; et quod post hujusmodi sacramenta sic ut praefertur praestita, officia sua respectiva exerceant et utantur; quibus quidem Praesidi et Concilio, aut aliquibus septem vel pluribus eorum, sacramenta praedicta de tempore in tempus administrare praedictis separalibus et respectivis officiariis et successoribus suis plenam potestatem et authoritatem damus et concedimus per praesentes. Et assignavimus nominavimus elegimus creavimus constituimus et fecimus, ac per praesentes pro nobis heredibus et successoribus nostris assignamus nominamus eligimus creamus constituimus et facimus dilectos subditos nostros praedictum Willielmum *Balle* Armigerum fore et esse primum et modernum Thesaurarium, et praedictum Iohannem[8] *Wilkins* et Henricum *Oldenburg* fore et esse primos et modernos Secretarios praedictae Regalis Societatis, continuandos in eisdem officiis usque ad praedictum festum Sancti Andreae Apostoli proximum sequentem post datum praesentium: Quodque de tempore in tempus et ad omnia tempora, in praedicto festo Sancti Andreae Apostoli (si non fuerit dies Dominicus et si fuerit dies Dominicus, tunc die proximo sequente) Praeses Concilium et Sodales praedictae Regalis Societatis pro tempore existentes, sive aliqui triginta et unus vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) sive major pars praedictorum triginta et unius vel plurium, probos et discretos viros de tempore in tempus in Thesaurarium et Secretarios, qui sunt et erunt de numero Concilii Regalis Societatis praedictae, eligere nominare et praeficere valeant et possint; quodque illi qui in separalia et respectiva officia praedicta sic ut praefertur electi praefecti et jurati fuerint, officia illa respectiva exercere et gaudere possint

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[5] *Sic in* Authentic.

[6] This Number of *seven* is *not* lessened by the third Charter as to the two *new* Oaths there enjoined; but as to this *Oath* of *Office*, *five* are made sufficient.

[7] *Sic in* Authentic.

his Deputy to be one,) or by the major Part of such Thirty-one or more: And they must be sworn before the President or his Deputy, and the Council, or any seven or more of them.

The first Treasurer named; and also the two first Secretaries.

On every St. Andrew's Day, (unless it be Sunday, and then on the next Day,) the President, Council, and Fellows, or any Thirty-one or more of them (of whom, &c.), or the major Part of such Thirty-one or more, may elect proper Persons out of the Council to be Treasurer and Secretaries; who, after being sworn, are to hold their Offices till the following St. Andrew's Day.

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[8] *Sic in* Authentic.

If the Elections of President, Council, Treasurer, and Secretaries, or any of them, cannot conveniently be made or finished upon St. Andrew's Day, the President, Council, and Fellows, or any Thirty-one or more of them, (of whom, &c.) or the major Part of such Thirty-one, or more, may appoint one or more other Day or Days, till they shall be finished.

et valeant usque ad praedictum festum Sancti Andreae extunc proximum sequentem, sacramentis suis praedictis sic ut praefertur priùs praestandis; et sic toties quoties casus sic acciderit. Et si contigerit electiones praedictas Praesidis, Concilii, Thesaurarii, Secretariorum, vel alicujus vel aliquorum eorum, in festo Sancti Andreae praedicto commode fieri vel perfici non posse, damus et concedimus praedictis Praesidi Concilio et Sodalibus, et successoribus eorum in perpetuum, quod ipsi, vel aliqui triginta et unus vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) vel major pars praedictorum triginta et unius vel plurium, licite possint nominare et assignare unum alium diem, quam proxime ad festum Sancti Andreae praedictum commode fieri poterit, pro electionibus praedictis faciendis vel perficiendis; et sic de die in diem, donec praedictae electiones perficiantur. Et si contigerit aliquem vel aliquos officiariorum praedictorum ejusdem Regalis Societatis obire, decedere, vel ab officiis suis respectivis amoveri, quod tunc et toties bene liceat et licebit Praesidi Concilio et Sodalibus praedictae Regalis Societatis, et eorum successoribus in perpetuum, sive aliquibus viginti et uni vel pluribus eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) seu majori parti praedictorum viginti et unius vel plurium, alium vel alios in officium sive officia illarum personarum sic defunctarum decedentium sive amotarum eligere et praeficere; et quod ille sive illi sic electus et praefectus electi et praefecti officia praedicta respectiva habeant et exerceant durante residuo ejusdem anni, et quousque alius sive alii ad officia illa respectiva debito modo electus et juratus fuerit, electi et jurati fuerint; et sic toties quoties casus sic acciderit.

If any of the said Officers die, quit, or be amoved, the President, Council, and Fellows, or any Twenty-one or more of them (of whom the President or his Deputy to be one,) or the major Part of such Twenty-one or more, may elect others for the Residue of the Year, and till new ones shall be elected and sworn.

The President and Council, (*every* Member of the Council being always duly summoned to extraordinary Meetings,) or any Nine or more of them, (of whom the President or his Deputy to be one) may meet in London or within ten Miles of London; and they, or the major Part of them, may make Laws, Statutes, and Ordinances, and transact all Matters relating to the Management of the So-

Et insuper volumus, ac de gratia nostra speciali ac ex certa scientia et mero motu nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae, et successoribus suis in perpetuum, quod Praeses et Concilium praedictae Regalis Societatis pro tempore existentes (praemissa semper in conventibus extraordinariis omnium Membrorum Concilii praedicti debita seu legitima summonitione vel citatione) sive aliqui novem vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) pariter congregare et assemblare possint et valeant in collegio sive aula sive alio loco conveniente intra civitatem nostram Londini, vel in aliquo alio loco conveniente intra decem milliaria ab eadem civitate nostra: et quod ipsi sic congregati et assemblati, sive major pars eorum, habebunt et habeant plenam authoritatem potestatem et facultatem de tempore in tempus condendi constituendi ordinandi faciendi et stabiliendi hujusmodi leges statuta jura ordinationes et constitutiones, quae eis aut eorum majori parti bona salubria utilia honesta et necessaria juxta eorum sanas discretiones fore videbuntur, pro meliori gubernatione regulatione et directione Regalis Societatis praedictae et cujuslibet Membri ejusdem, omniaque ad gubernationem res bona facultates redditus terras tenementa hereditamenta et negotia Regalis Societatis praedictae spectantia agendi et faciendi; quae omnia et singula leges statuta jura ordinationes et constitutiones sic ut praefertur facienda volumus, et per praesentes pro nobis heredibus et successoribus nostris firmiter injungendo praecipimus et mandamus, quod de tempore in tempus inviolabiliter observata fuerint, secundum tenorem et effectum eorundem: Ita tamen, quod praedictae leges statuta jura ordinationes et constitutiones sic ut praefertur facienda, et eorum quaelibet, sint rationabilia, et non sint repugnantia nec contraria legibus consuetudinibus juribus sive statutis hujus regni nostri Angliae.

ciety and its Affairs; and all their Acts shall be valid: But their Statutes must be reasonable, and not contrary to Law.

Et vlterivs de ampliori gratia nostra speciali ac ex certa scientia et mero motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus, praefatis Praesidi *Concilio*[9] *et Sodalibus* praedictae Regalis Societatis, et successoribus suis in perpetuum, *sive aliquibus viginti et uni vel pluribus eorum* (quorum Praesidem pro tempore existentem, vel ejus Deputatum, semper unum esse volumus) *seu majori parti praedictorum viginti et unius vel plurium*, plenam potestatem et authoritatem de tempore in tempus eligendi nominandi et constituendi unum vel plures Typographos sive Impressores, et Chalcographos seu Sculptores, et ipsi vel ipsis per scriptum communi Sigillo praedictae Regalis Societatis sigillatum, et manu Praesidis pro tempore existentis signatum, facultatem concedendi, ut imprimant tales res materias et negotia praedictam Regalem Societatem tangentia vel concernentia, quales praedicto Typographo vel Impressori, Chalcographo seu Sculptori, vel Typographis vel Impressoribus, Chalcographis vel Sculptoribus, de tempore in tempus per Praesidem et Concilium Praedictae Regalis

The President, Council, and Fellows, or any Twenty-one or more of them, (of whom the President or his Deputy to be always one,) or the major Part of such Twenty-one or more, may appoint one Printer or more, and one Engraver or more, and authorize them, by writing under the common Seal, and signed by the President, to print such Things (touching or concerning the Royal Society) as shall be given them in Charge by the President and Council, or any Seven or more of them (of whom the President or his Deputy to be one,) or the major Part of such Seven or more.

They must be first sworn before the President and Council, or Seven or more of them.

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[9] V. post, p. 521.

Societatis, vel aliquos septem vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) vel per majorem partem praedictorum septem vel plurium, commissae fuerint; sacramentis suis corporalibus, antequam ad officia sua exercenda admittantur, coram Praeside et Concilio pro tempore existente, vel aliquibus septem vel pluribus eorum, in forma et effectu ultimis specificatis[10], prius praestandis; quibus quidem Praesidi et Concilio vel aliquibus septem vel pluribus eorum, sacramenta praedicta administrare plenam potestatem et authoritatem damus et concedimus per praesentes.

The President, Council and Fellows, or any nine or more of them (of whom, &c.) or the major Part of such nine or more, shall have the same Right to demand and receive (by their Assignee or Assignees) the Bodies of executed Criminals, and to anatomize them, as the College of Physicians and the Company of Surgeons of London use or enjoy.

Et vlterivs, quod praedicti Praeses Concilium et Sodales praedictae Regalis Societatis in philosophicis suis studiis meliorem sortiantur effectum, de ampliori gratia nostra speciali ac ex certa scientia et mero motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus praedictis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis in perpetuum, quod ipsi et successores sui, sive aliqui novem vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) sive major pars praedictorum novem vel plurium, de tempore in tempus habeant et habebunt plenam potestatem et authoritatem de tempore in tempus, et ad talia tempestiva tempora, secundum eorum discretionem, per assignatum vel assignatos suos requirere capere et recipere cadavera talium personarum, quae mortem manu carnificis passae fuerunt, et ea anatomizare, in tam amplis modo et forma, et ad omnes intentiones et proposita, prout Praesidens Collegii Medicorum et Societatis Chirurgorum civitatis nostrae *London* (quibuscunque nominibus duae praedictae corporationes insignitae fuerint) eisdem cadaveribus usi vel gavisi fuerunt, aut uti vel gaudere valeant et possint.

Licence is given to them or any nine (as last above), or the major Part of them, to hold a Correspondence, on Philosophical, Mathematical, or Mechanical Subjects, with all sorts of Foreigners, by Letters signed by the President or his Deputy, in the Presence of the

Et vlterivs, pro melioratione experimentorum artium et scientiarum praedictae Regalis Societatis, de abundantiori gratia nostra speciali ac ex certa scientia et mero motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis et successoribus suis in perpetuum, quod ipsi et successores sui, sive aliqui novem vel plures eorum (quorum Praesidem pro tempore existentem, vel ejus Deputatum, unum esse volumus) sive major pars praedictorum novem vel plurium, de tempore in tempus habeant et habebunt plenam potestatem et authoritatem per literas vel epistolas, sub manu praedicti Praesidis vel ejus Deputati, in praesentia Concilii vel aliquorum septem vel plurium eorum, et in nomine Regalis Societatis, mutuis intelligentiis fruentur[11] et negotiis[12] cum omnibus et omnimodis peregrinis et alienis, utrum privatis vel collegiatis, corporatis vel politicis, absque aliqua molestatione interruptione vel inquietate[13] quacunque: Proviso tamen, quod haec indulgentia nostra sic, ut praefertur, concessa ad ulteriorem non extendatur usum, quam particulare beneficium et interesse praedictae Regalis Societatis in materiis seu rebus philosophicis mathematicis aut mechanicis.

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[10] *Sic in* Authentic.

Council, or any Seven or more of them, and in the name of the Society.

Et vlterivs dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus, praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis in perpetuum, sive Praesidi et Concilio Regalis Societatis praedictae vel majori parti eorum, plenam potestatem et authoritatem erigendi aedificandi et extruendi, aut erigi aedificari et extrui faciendi vel causandi, intra civitatem nostram Londini, vel decem milliaria ab eadem, unum vel plura collegium vel collegia cujuscunque modi et qualitatis, pro habitatione assemblatione et congregatione praedictorum Praesidis Concilii et Sodalium praedictae Regalis Societatis et successorum suorum, ad negotia sua et alias res eandem Regalem Societatem concernentes ordinandum et disponendum.

Licence given to the President, Council, and Fellows, or to the President and Council, or the major Part of them, to build a College or Colleges in London, or within ten Miles of it.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris ordinamus constituimus et appunctuamus, quod si aliqui abusus vel discrepantiae in posterum orientur et accident de gubernatione aut aliis rebus vel negotiis praedictae Regalis Societatis, unde ejusdem constitutioni stabilimini et studiorum progressui vel rebus et negotiis aliqua inferatur injuria vel impedimentum; quod tunc et toties per praesentes pro nobis heredibus et successoribus nostris authorizamus nominamus assignamus et constituimus praefatum

If any abuses shall happen, or Dissensions arise, they shall be reformed and settled by the Earl of Clarendon (Lord Chancellor) alone, if living; and after his Death by the Archbishop of Canterbury, the Chancellor or Keeper of the Great Seal, the Treasurer, Privy Seal, Bishop of London, and two

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[11] *Sic in* Authentic.

[12] In the first Charter it is "*notitiis:*" v. ante, p. 496.

[13] *Sic in* Authentic.

principal Secretaries, for the Time being, or any four or more of them.

praedilectum et perquam fidelem consanguineum et conciliarium nostrum Edwardum Comitem de *Clarendon* Cancellarium nostrum regni nostri Angliae, per seipsum durante vita sua, et post ejus mortem, tunc Archiepiscopum Cantuariensem, Cancellarium vel Custodem magni Sigilli Angliae, Thesaurarium Angliae, Custodem privati Sigilli, Episcopum Londinensem, et duos principales Secretarios pro tempore existentes, aut aliquos quatuor vel plures eorum, easdem discrepantias et abusus reconciliare componere et reducere.

General Clauses.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris firmiter injungendo praecipimus et mandamus omnibus et singulis Iustitiariis, Majoribus, Aldermannis, Vicecomitibus, Ballivis, Constabulariis, et aliis officiariis ministris et subditis nostris heredum et successorum nostrorum quibuscunque, quod de tempore in tempus sint auxiliantes et assistentes praedictis Praesidi Concilio et Sodalibus Regalis Societatis praedictae, eorumque in perpetuum successoribus, in omnibus et per omnia, secundum veram intentionem harum Literarum nostrarum patentium.

Eo, quod expressa mentio de vero valore annuo, vel de certitudine praemissorum sive eorum alicujus, aut de aliis donis sive concessionibus per nos seu per aliquem progenitorum sive praedecessorum nostrorum praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae ante haec tempora factis, in praesentibus minime facta existit, aut aliquo statuto actu ordinatione provisione proclamatione sive restrictione in contrarium inde antehac habitis factis editis ordinatis sive provisis, aut aliqua alia re causa vel materia quacunque, in aliquo non obstante.

In cvivs rei testimonium has Literas nostras fieri fecimus patentes. Teste Me ipso apud Westmonasterium, vicesimo secundo die Aprilis, anno regni nostri decimo quinto[14].

Per breve de privato sigillo.

HOWARD.

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[14] This Charter is on four sheets of vellum; and, like the first, contains some very fine ornamented capital letters. The Arms of the Society coloured appear on the first sheet.

III.

CHARTA TERTIA[1],

Granting Chelsea College and further Privileges,

Iisdem ab eodem concessa, *A.D.* MDCLXIX.

CAROLVS SECVNDVS Dei gratia Angliae Scotiae Franciae et Hiberniae Rex, fidei Defensor, etc., omnibus ad quos hae Literae nostrae patentes pervenerint, salutem.

Grant of Lands in Chelsey.

SCIATIS, quod nos de gratia nostra speciali ac ex certa scientia et mero motu nostris dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus dilectis et fidelibus nostris *Praesidi Concilio et Sodalibus Regalis Societatis Londini pro scientia naturali promovenda*, et successoribus suis in perpetuum, totam illam peciam terrae arabilis vocatam *Teamshott*, continentem per aestimationem viginti acras, jacentem inter viam nostram ducentem a Westmonasterio versus *Chelsey*, ex parte boreali et occidentali, et peciam prati continentem per aestimationem quatuor acras, parcellam octodecim acrarum prati nuper in tenura Comitis Nottinghamiensis vel assignatorum suorum, ex parte australi, ac clausum prati vocatum *Stone-Bridge Close* ex parte orientali, et peciam terrae arabilis nuper in occupatione Thomae *Evans* vel assignatorum suorum, ex parte occidentali; per particularia inde mentionata esse annualis redditus, sive valoris, viginti trium solidorum et quatuor denariorum; Nec non totum illum praedictum clausum prati vocatum *Stony Bridge Close*, continentem per aestimationem quatuor acras, nuper in occupatione Iohannis *Deakes* vel assignatorum suorum, jacentem inter rivum vocatum *Le Common Sewer* ex parte orientali, et praedictam peciam terrae vocatam

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[1] The warrant for this Charter is preserved in the State-Paper Office. It is dated May 24, 1667.

Teamshott ex parte occidentali, et pontem vocatum *Stony Bridge* ex parte boreali; per particularia inde mentionata esse annualis redditus, sive valoris, viginti solidorum; Nec non totam illam unam peciam terrae arabilis in communi campo vocato *East Field*, continentem per aestimationem tres acras, nuper in occupatione Thomae *Frances* vel assignatorum suorum, jacentem inter praedictam peciam terrae vocatam *Teamshott* ex parte orientali, peciam terrae arabilis nuper in tenura Comitis Lincolniensis vel assignatorum suorum, ex parte occidentali, parcellam prati de *Earles-Court Land*, ex parte australi, et viam nostram ducentem a Westmonasterio versus *Chelsey* praedictam, ex parte boreali et occidentali; per particularia inde mentionata esse annualis redditus sive valoris quatuor solidorum; (quae quidem praemissa sunt aut olim fuerunt parcella terrae nostrae in *Chelsey*, existentis parcellae terrae Dominicalis Manerii de *Chelsey* praedicta, ac nuper fuerunt parcella possessionum Iohannis nuper Ducis Northumbriae; et quae nuper per praecharissimum avum nostrum beatae memoriae Iacobum Regem per Literas suas patentes, gerentes datum apud Westmonasterium octavo die Maii anno regni sui Angliae octavo et Scotiae quadragesimo tertio, concessa fuerunt aut mentionata esse concessa Praeposito et Sociis Collegii Regis Iacobi in *Chelsey* prope *London* ex fundatione ejusdem Iacobi Regis Angliae, et successoribus suis in perpetuum; tenendum de praefato Iacobo Rege, ut de manerio suo de *East Greenwich* in comitatu Cantiae, per fidelitatem tantum, in libero et communi soccagio, et non in capite, nec per servitium militare;) Ac etiam omnia et singula domus aedificia structuras boscos subboscos arbores, ac totam terram fundum et solum eorundem boscorum subboscorum et arborum, ac omnia alia jura jurisdictiones franchesias privilegia libertates proficua commoditates advantagia emolumenta et hereditamenta nostra quaecunque, cum eorum pertinentiis universis, cujuscunque sint generis naturae seu speciei, seu quibuscunque nominibus sciantur censeantur nuncupentur seu cognoscantur, situata jacentia et existentia provenientia crescentia renovantia sive emergentia infra comitatum villas campos loca sive hamletas praedicta, vel alibi ubicunque, praedictis terris et caeteris praemissis vel alicui inde parcellae quoquo modo spectantia; Necnon reversionem et reversiones omnium et singulorum praemissorum superius per praesentes praeconcessorum, et cujuslibet inde parcellae, dependentes vel expectantes de in vel super aliquam dimissionem vel concessionem pro termino vel terminis vitae vel vitarum vel annorum, aut aliter de praemissis superius per praesentes praeconcessis seu de aliqua inde parcella quoquo modo factam, existentem de recordo vel non de recordo; Necnon omnia et singula redditus et annualia proficua quaecunque reservata super quibuscunque dimissionibus vel concessionibus de et super praemissa per praesentes praeconcessa, vel de et super aliquam inde parcellam.

Dedimus etiam et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus, praefatis Praesidi Concilio et Sodalibus Regalis Societatis Londoni pro scientia naturali promovenda, et successoribus suis in perpetuum, quod ipsi et eorum successores de caetero in perpetuum habeant teneant et gaudeant, ac habere tenere et gaudere valeant et possint, infra praemissa superius per praesentes praeconcessa, ac infra quamlibet inde parcellam, tot tanta talia eadem hujusmodi et consimilia jura jurisdictiones libertates franchesias consuetudines privilegia proficua commoditates advantagia emolumenta et hereditamenta quaecunque, quot quanta qualia et quae, ac adeo plene libere et integre, ac in tam amplis modo et forma, prout praedictus Iohannes nuper Dux Northumbriae, aut praedictus Praepositus et Socii Collegii Regis Iacobi in *Chelsey* prope *London* ex fundatione ejusdem Iacobi Regis Angliae, aut aliquis alius sive aliqui alii, praedicta terras tenementa et caetera praemissa cum suis pertinentiis, aut aliquam inde parcellam, unquam antehac habentes possidentes aut seisiti inde existentes, habens possidens aut seisitus inde existens, unquam habuerunt tenuerunt usi vel gavisi fuerunt, habuit tenuit usus vel gavisus fuit, seu habere tenere uti vel gaudere debuerunt aut debuit, in praemissis superius per praesentes praeconcessis, aut aliqua inde parcella, ratione vel praetextu alicujus chartae doni concessionis vel confirmationis per nos seu aliquem progenitorum vel antecessorum nostrorum nuper Regum vel Reginarum Angliae antehac habitorum factorum vel concessorum seu confirmatorum, aut ratione vel praetextu alicujus actus Parliamenti vel aliquorum actuum Parliamentorum, aut ratione vel praetextu alicujus legitimae praescriptionis usus seu consuetudinis antehac habitorum seu usitatorum, aut aliter quocunque legali modo jure seu titulo; ac adeo plene libere et integre, ac in tam amplis modo et forma, prout nos aut aliquis progenitorum vel antecessorum nostrorum nuper Regum vel Reginarum Angliae praedictae terras tenementa et caetera praemissa, aut aliquam inde parcellam, habuimus et gavisi fuimus aut habuerunt et gavisi fuerunt, seu habere et gaudere debuimus aut habere et gaudere debuerunt aut debuit.

DAMVS ulterius, ac per praesentes pro nobis heredibus et successoribus nostris concedimus, praefatis Praesidi Concilio et Sodalibus Regalis Societatis Londini pro scientia naturali promovenda, et eorum successoribus, omnia et singula praemissa superius per praesentes praeconcessa, cum eorum pertinentiis universis, adeo plene libere et integre, ac in tam amplis modo et forma, prout ea omnia et singula praemissa, aut aliqua inde parcella, ad manus nostras, seu ad manus aliquorum progenitorum vel antecessorum nostrorum nuper Regum vel Reginarum Angliae, ratione vel praetextu dissolutionis vel sursum redditionis alicujus nuper monasterii prioratus sive hospitalis, aut ratione vel praetextu alicujus actus Parliamenti vel aliquorum actuum Parliamentorum, aut ratione alicujus attincturae sive forisfacturae, aut ratione alicujus excambii vel perquisiti, aut alicujus doni vel concessionis, aut ratione eschaetae, aut quocunque alio legali modo jure seu titulo devenerunt seu devenire debuerunt, ac in manibus nostris jam existunt seu existere debent vel debuerunt: habendum tenendum et gaudendum praedicta terras tenementa et hereditamenta, ac caetera omnia et singula praemissa superius per praesentes praeconcessa, cum eorum pertinentiis universis, praefato Praesidi Concilio et Sodalibus Regalis Societatis Londini pro scientia naturali promovenda, et successoribus suis in perpetuum; tenendum de nobis heredibus et successoribus nostris, ut de manerio nostro de *East Greenwich* in comitatu nostro Cantiae, per fidelitatem tantum, in libero et communi soccagio, et non in capite, nec per servitium militare; ac reddendum annuatim nobis heredibus et successoribus nostris de et pro praedicta terra arabili vocata *Teamshott* viginti tres solidos et quatuor denarios, ac de et pro praedicto clauso prati vocato *Stony Bridge Close* viginti solidos, ac de et pro praedicta pecia terrae arabilis in communi campo vocato *East Field* quatuor solidos legalis monetae Angliae, ad festa Sancti Michaelis Archangeli et Annunciationis beatae Mariae Virginis, ad receptam Scaccarii nostri Westmonasterii heredum et successorum nostrorum seu ad manus Ballivorum,

Tenure.

Rent.

seu Receptorum praemissorum pro tempore existente[2], per aequales portiones annuatim solvendas in perpetuum.

Exonerations, Acquittances, &c.

Et vlterivs de uberiori gratia nostra speciali ac ex certa scientia et mero motu nostris volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefato Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod nos heredes et successores nostri de caetero in perpetuum annuatim, et de tempore in tempus, exonerabimus acquietabimus et indempnes conservabimus, tam praefatos Praesidem Concilium et Sodales Regalis Societatis praedictae et successores suos, quam praedicta terras tenementa et caetera omnia et singula praemissa superius expressa et specificata ac per praesentes praeconcessa, et quamlibet inde parcellam, cum eorum pertinentiis universis, de et ab omnibus et omnimodis corrodiis redditibus feodis servitiis annuitatibus pensionibus portionibus ac denariorum summis ac oneribus quibuscunque de praemissis, seu aliqua inde parcella, nobis heredibus vel successoribus nostris exeuntibus vel solvendis, vel superinde versus nos heredes vel successores nostros oneratis vel onerandis; praeterquam de redditibus servitiis et tenuris superius in his praesentibus nobis heredibus et successoribus nostris reservatis, ac praeterquam de dimissionibus et concessionibus de praemissis seu de aliqua inde parcella antehac factis, ac conventionibus et conditionibus in iisdem existentibus, ac conventionibus et oneribus, quae aliquis firmarius seu aliqui firmarii praemissorum ratione indenturarum et dimissionum suarum facere et exonerare tenetur seu tenentur.

Volvmvs etiam, ac per praesentes pro nobis heredibus et successoribus nostris firmiter injungendo praecipimus, tam Commissionariis pro thesauro nostro, Thesaurario, Camerario, Subthesaurario, et Baronibus Scaccarii nostri heredum et successorum nostrorum pro tempore existente, quam omnibus et singulis Auditoribus, et aliis officiariis, et ministris nostris heredum et successorum nostrorum quibuscunque pro tempore existente; quod ipsi et eorum quilibet super solam demonstrationem harum Literarum nostrarum patentium, vel irrotulamenti earundem, absque aliquo alio brevi seu warranto a nobis heredibus vel successoribus nostris quoquo modo impetrando seu prosequendo, plenam integram debitamque allocationem et exonerationem manifestam de et ab omnibus et omnimodis hujusmodi corrodiis redditibus feodis pensionibus portionibus et denariorum summis ac oneribus quibuscunque (praeterquam de servitiis redditibus tenuris ac arreragiis redditus ac caeteris praemissis in his praesentibus, ut praefertur, reservatis, et per praefatos Praesidem Concilium et Sodales Regalis Societatis praedictae et successores suos solubilibus fiendis[3] seu performandis) de praemissis per praesentes praeconcessis, seu de aliqua inde parte vel parcella, nobis heredibus vel successoribus nostris exeuntibus seu solvendis, vel superinde versus nos heredes vel successores nostros oneratis seu onerandis, praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis facient, et de tempore in tempus fieri causabunt: Et hae Literae nostrae patentes, vel irrotulamentum earundem, erunt de tempore in tempus, tam dictis Commissionariis pro thesauro nostro, Thesaurario, Cancellario, et Baronibus Scaccarii nostri heredum et successorum nostrorum pro tempore existente, quam omnibus et singulis Auditoribus, et aliis officiariis, et ministris nostris heredum et successorum nostrorum quibuscunque pro tempore existente, sufficiens warrantum et exoneratio in hac parte.

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[2] *Sic in* Authentic. *et passim infra.*

Recital of some Parts of the Second Charter.

Et cvm nos per Literas nostras patentes, gerentes datum apud Westmonasterium vicesimo secundo die Aprilis, anno regni nostri decimo quinto, Praesidi Concilio et Sodalibus Regalis Societatis praedictae factas, inter alia concessimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis, et successoribus suis in perpetuum, quod si contigerit Praesidem ejusdem Regalis Societatis pro tempore existente aegritudine vel infirmitate detineri, vel in servitio nostro heredum vel successorum nostrorum versari, vel aliter esse occupatum, ita quod necessariis negotiis ejusdem Regalis Societatis officium Praesidis tangentibus attendere non poterit; quod tunc et toties bene liceat et licebit eidem Praesidi sic detento versato vel occupato *unum* de Concilio praedictae Regalis Societatis pro tempore existente, fore et esse *Deputatum* ejusdem Praesidis, nominare et appunctuare; qui quidem Deputatus, in officio Deputati Praesidis praedicti sic faciendus et constituendus, sit et esset Deputatus ejusdem Praesidis de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante toto tempore, quo praedictus Praeses in officio praesidis continuaverit, *nisi* interim praedictus Praeses Regalis Societatis praedictae pro tempore existente unum alium de praedicto Concilio ejus Deputatum fecerit et constituerit; Et quod quilibet hujusmodi Deputatus praedicti Praesidis, sic ut praefertur faciendus et constituendus, omnia et singula quae ad officium Praesidis praedictae Regalis Societatis pertinent seu pertinere debent, vel per praedictum Praesidem virtute istarum Literarum nostrarum patentium limitata et appunctuata fore[4] facienda et exequenda, de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante tali tempore, quo Deputatus praedicti Praesidis continuaverit, facere et exequi valeat et possit, vigore istarum Literarum nostrarum patentium, adeo plene libere et integre, ac in tam amplis modo et forma, prout Praeses praedictus, si praesens esset, illa facere et exequi valeat et possit; sacramento corporali super sancti Dei Evangelia, in forma et effectu in eisdem Literis nostris patentibus specificatis, per hujusmodi Deputatum, ad omnia et singula quae ad officium Praesidis pertinent bene et fideliter exequendum, coram praefato Concilio praedictae Regalis Societatis vel aliquibus *septem* vel pluribus eorum, priùs praestando; et sic toties quoties casus sic acciderit; cui quidem Concilio, vel aliquibus *septem* vel pluribus eorum pro tempore existente, sacramentum praedictum administrare potestatem et authoritatem, quoties casus sic acciderit, dedimus et concessimus per easdem Literas nostras patentes, absque brevi commissione sive ulteriori warranto in ea parte à nobis heredibus et successoribus nostris procurandis seu obtinendis; Ac quod ipsi et successores eorum, seu aliqui novem vel plures eorum (quorum Praesidem pro tempore existente, vel ejus Deputatum, semper unum esse volumus) conventus seu congregationes de seipsis pro experimentorum et rerum naturalium cognitione et indagine aliisque negotiis ad Societatem praedictam spectantibus, quoties et quando opus fuerit, licite facere et habere possint in collegio sive aula sive alio loco commodo[5] *intra civitatem nostrum* London, *vel in aliquo alio loco commodo intra decem milliaria ab eadem civitate nostra:* Et cum diversa et varia res potestates libertates et privilegia in iisdem Literis nostris patentibus praefato Praesidi Concilio ac Sodalibus Regalis

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[3] *Sic in* Authentic.

It takes Notice that several Powers, granted by *that* Charter, cannot be executed but by the President and Council, or *seven* or *more* of them; by virtue of *that* Charter.

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[4] *Sic in* Authentic.

[5] V. ante, p. 499.

Societatis praedictae concessa, virtute istarum Literarum nostrarum patentium, non sunt exercenda facienda performanda seu exequenda, nisi per praedictum Praesidem et Concilium, aut aliquos septem vel plures eorum; Et cum ulterius per praedictas Literas nostras patentes pro nobis heredibus et successoribus nostris dedimus et concessimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis, et successoribus suis in perpetuum[6], sive aliquibus *viginti et uni vel pluribus* eorum (quorum Praesidem pro tempore existente, vel ejus Deputatum, semper unum esse volumus) seu majori parti praedictorum *viginti et unius vel plurium*, plenam potestatem et authoritatem de tempore in tempus eligendi nominandi et constituendi unum vel plures Typographos sive Impressores, et Chalcographos seu Sculptores, et ipsi vel ipsis per scriptum communi Sigillo praedictae Regalis Societatis sigillatum, et manu Praesidis pro tempore existente signatum, facultatem concedendi, ut imprimant tales res materias et negotia praedictam Regalem Societatem tangentia vel concernentia, quales praedictis Typographo vel Impressori, Chalcographo vel Sculptori, vel Typographis vel Impressoribus, Chalcographis vel Sculptoribus, de tempore in tempus per Praesidem et Concilium praedictae Regalis Societatis, vel aliquos septem vel plures eorum (quorum Praesidem pro tempore existente, vel ejus Deputatum, unum esse volumus) vel per majorem partem praedictorum septem vel plurium commissa[7] fuerint; sacramentis suis corporalibus, antequam ad officia sua exercenda admittantur, coram Praeside et Concilio pro tempore existente, vel aliquibus septem vel pluribus eorum, prius praestandis; cui quidem Praesidi et Concilio, vel aliquibus septem vel pluribus eorum pro tempore existente, sacramenta praedicta administrare plenam potestatem et authoritatem dedimus et concessimus per praedictas Literas nostras patentes; prout in eisdem Literis nostris patentibus[8], relatione inde habita, plenius liquet et apparet.

This Charter directs that the President's Deputy shall continue in Office, *although* the President do appoint one or more others:

Nos de abundantiori gratia nostra speciali ac ex certa scientia et mero motu nostris, DEDIMVS et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus, praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis, et successoribus suis in perpetuum, quod de caetero in perpetuum, si contigerit Praesidem ejusdem Regalis Societatis pro tempore existente aegritudine vel infirmitate detineri, vel in servitio nostro heredum vel successorum nostrorum versari, vel aliter esse occupatum, ita quod necessariis negotiis ejusdem Regalis Societatis officium Praesidis tangentibus attendere non poterit; quod tunc et toties bene liceat et licebit eidem Praesidi sic detento versato vel occupato unum de Concilio praedictae Regalis Societatis pro tempore existente, fore et esse Deputatum ejusdem Praesidis, nominare et appunctuare; qui quidem Deputatus, in officio Deputati Praesidis praedicti sic faciendus et constituendus, sit et erit Deputatus ejusdem Praesidis de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante toto tempore, quo praedictus Praeses in officio Praesidis continuaverit, *etiamsi* interim Praeses Regalis Societatis praedictae pro tempore existente *unum alium vel plures alios* de praedicto Concilio ejus Deputatum et Deputatos fecerit et constituerit; cui quidem Praesidi pro tempore existente *duos vel plures* de praedicto Concilio ejus Deputatos ipso et eodem tempore facere et constituere potestatem et authoritatem, quoties ei placuerit, damus et concedimus per praesentes pro nobis heredibus et successoribus nostris; Et quod quilibet hujusmodi Deputatus et Deputati praedicti Praesidis sic ut praefertur faciendi et constituendi, omnia et singula quae ad officium Praesidis praedictae Regalis Societatis pertinent seu pertinere debent, vel per praedictum Praesidem virtute praedictarum Literarum nostrarum patentium vel praesentium, limitata et appunctuata fore[9] facienda et exequenda de tempore in tempus, toties quoties praedictus Praeses sic abesse contigerit, durante tali tempore, quo Deputatus et Deputati praedicti Praesidis continuaverit et continuaverint, facere et exequi valeat et possit valeant et possint, vigore harum Literarum nostrarum patentium, adeo plene libere et integre, ac in tam amplis modo et forma, prout Praeses praedictus, si praesens esset, illa facere et exequi valeret et posset; sacramento corporali super sancta Dei Evangelia, in forma et effectu in eisdem Literis nostris patentibus specificatis, per hujusmodi Deputatum et Deputatos ad omnia et singula, quae ad officium Praesidis pertinent, bene et fideliter exequendum, coram praefato Concilio praedictae

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[6] V. ante, p. 505.

[7] *Sic in* Authentic.

[8] V. ante. p. 506.

And it gives him express Power to appoint *two* or *more* Deputies, out of the Council, at one and the same Time; who may, each of them, do the same Acts in his Absence, as he himself could do if present.

But they must first be sworn before the Council, or *five* or more of them.

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[9] *Sic in* Authentic.

Regalis Societatis, vel aliquibus *quinque*[10] vel pluribus eorum, prius praestando; et sic toties quoties casus sic acciderit; cui quidem Concilio, vel aliquibus *quinque* vel pluribus eorum pro tempore existente, sacramentum praedictum administrare potestatem et authoritatem, quoties casus sic acciderit, damus et concedimus per praesentes, absque brevi commissione sive ulteriori warranto in ea parte à nobis heredibus et successoribus nostris procurandis seu obtinendis;

For the Future, the President, Council, and Fellows, or any nine of them (of whom the President or his Deputy to be always one,) may hold their Assemblies any where *within the Kingdom of* ENGLAND.

AC VLTERIVS, quod de caetero in perpetuum ipsi et successores eorum, seu aliqui novem vel plures eorum (quorum Praesidem pro tempore existente, vel ejus Deputatum, semper unum esse volumus) conventus seu congregationes de seipsis pro experimentorum et rerum naturalium cognitione et indagine aliisque negotiis ad Societatem praedictam spectantibus, quoties et quando opus fuerit, licite facere et habere possint in collegio sive aula sive alio loco commodo *intra regnum nostrum Angliae;*

All Powers, &c. which could not be exercised heretofore but by the President and Council, or *seven* or more of them, may for the future be exercised by the President and Council, or any *five* or more of them.

AC VLTERIVS, quod omnia et singula res potestates libertates et privilegia in praedictis Literis nostris patentibus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae concessa, virtute istarum Literarum nostrarum patentium, quae non sunt exercenda facienda performanda seu exequenda, nisi per praedictum Praesidem et Concilium, aut aliquos *septem* vel plures eorum; de caetero in perpetuum exerceri fieri performari seu exequi possint et valeant per praedictum Praesidem et Concilium, aut aliquos *quinque* vel plures eorum.

For the future, the *President* may appoint one Printer or more, and one Engraver or more, and authorize him or them to print such Things (touching or concerning the Royal Society) as shall be given to him or them in Charge, by the President and Council, or any *five* or more of them (of whom the President or his Deputy to be one), or by the major Part of such five or more.

AC VLTERIVS de uberiori gratia nostra dedimus et concessimus, ac per praesentes pro nobis heredibus et successoribus nostris damus et concedimus praefatis Praesidi Concilio et Sodalibus praedictae Regalis Societatis, et successoribus suis in perpetuum, quod de caetero in perpetuum bene liceat et licebit *Praesidi* Regalis Societatis praedictae pro tempore existente, de tempore in tempus eligere nominare et constituere aliquem vel aliquos Typographum sive Impressorem, Typographos sive Impressores, et Chalcographum seu Sculptorem, Chalcographos seu Sculptores, et ipsi vel ipsis facultatem concedere, ut imprimant tales res materias et negotia praedictam Regalem Societatem tangentia vel concernentia, quales praedictis Typographo vel Impressori, Chalcographo seu Sculptori, vel Typographis vel Impressoribus, Chalcographis vel Sculptoribus, de tempore in tempus per Praesidem et Concilium praedictae Regalis Societatis, vel aliquos *quinque* vel plures eorum (quorum Praesidem pro tempore existente, vel ejus Deputatum, unum esse volumus) vel per majorem partem praedictorum *quinque* vel plurium commissae fuerint; sacramentis suis corporalibus, antequam ad officia sua exercenda admittantur, coram Praeside et Concilio pro tempore existente, vel aliquibus *quinque* vel pluribus eorum, priùs praestandis; et sic toties quoties casus sic acciderit: cui quidem Praesidi et Concilio pro tempore existente, vel aliquibus *quinque* vel pluribus eorum, sacramenta praedicta administrare plenam potestatem et authoritatem damus et concedimus per praesentes.

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[10] N. B. The Oaths of Obedience and Supremacy require *Seven*. V. post, p. 520.

They must be first sworn before the President and Council, or any *five* or more of them.

Et vlterivs volumus, ac per praesentes pro nobis heredibus et successoribus nostris concedimus praefatis Praesidi Concilio et Sodalibus Regalis Societatis praedictae et successoribus suis, quod hae Literae nostrae patentes, vel irrotulamentum earundem, stabunt et erunt in omnibus et per omnia bonae firmae validae sufficientes et effectuales in lege ad omnes respectus proposita constructiones et intentiones erga et contra nos heredes et successores nostros, tam in omnibus curiis nostris, quam alibi intra regnum nostrum Angliae, absque aliquibus confirmationibus licentiis vel tolerationibus de nobis heredibus vel successoribus nostris quoquo modo in posterum procurandis aut obtinendis;

General confirmatory Clauses.

Non obstante male nominando vel male recitando aut non recitando praedicta terras tenementa et caetera praemissa, vel aliquam inde parcellam; Et non obstante non inveniendo officium aut inquisitionem praemissorum, aut alicujus inde parcellae, per quae titulus noster inveniri debuit, ante confectionem harum Literarum nostrarum patentium; Et non obstante male recitando vel non recitando aliquam dimissionem vel concessionem de praemissis vel de aliqua inde parcella factam, existentem de recordo vel non de recordo; Et non obstante male nominando vel non nominando aliquam villam hamletam parochiam locum vel comitatum, in quibus praemissa vel aliqua inde parcella existunt vel existit; Et non obstante, quod de nobis tenentium firmariorum sive occupatorum praemissarum, vel alicujus inde parcellae, plena vera et certa non fit mentio; Et non obstante aliquibus defectibus[11] de certitudine vel computatione aut declaratione veri annui valoris praemissorum, aut alicujus inde parcellae; aut annualis redditus reservati de et super praemissis, vel de et super aliqua inde parcella, in his Literis nostris patentibus expressis et contentis; Et non obstante statuto in Parliamento Domini Henrici nuper Regis Angliae sexti progenitoris nostri, anno regni sui decimo octavo, facto et edito; Et non obstante aliquibus aliis defectis[11], in non certe nominando naturam genus specei[11] quantitatem aut qualitatem praemissorum, aut alicujus inde parcellae; Et non obstante statuto de terris et tenementis ad manum mortuam non ponendis, aut aliquo alio statuto actu ordinatione proclamatione provisione sive restrictione in contrarium inde antehac habitis factis editis ordinatis seu provisis, in aliquo non obstante: SALVO tamen Andreae *Cole* Armigero et omnibus aliis personis quibuscunque, praeterquam nos heredes et successores nostros, talia jus clameum interesse et demanda quaecunque, qualia ipse vel ipsi seu eorum aliquis habet seu habeant, aut de jure habere debent[11], de et in praemissis, seu aliqua parte vel parcella inde.

The President and Vice-Presidents are enjoined to take the Oath of *Obedience* and the Oath of *Supremacy*, before the Council, or *seven* or more of them, previously to their acting.

ET VLTERIVS volumus, et per praesentes pro nobis heredibus et successoribus nostris ordinamus et firmiter injungendo praecipimus, quod Praeses Societatis praedictae pro tempore existente, et Deputati ejus, antequam ipsi aut eorum aliqui ad executionem officii illius admittantur, tam sacramentum corporale communiter vocatum *The oath of* Obedience, quam sacramentum corporale communiter vocatum *The oath of* Supremacy, super sacrosanctis Dei Evangeliis praestabunt, et eorum quilibet praestabit, coram Concilio ejusdem Societatis, aut aliquibus *septem*[12] vel pluribus eorum; (cui quidem Concilio, aut aliquibus *septem* vel pluribus eorum, sacramenta praedicta administrare pro nobis heredibus et successoribus nostris plenam potestatem et authoritatem de tempore in tempus, quotiescunque opus fuerit, damus et concedimus per praesentes).

PROVISO semper, et voluntas et intentio nostra regia est, quod terrae et praemissa praedicta per praesentes, ut praefertur, concessa, seu eorum aliqua *non alienabuntur vel vendentur* alicui personae sive aliquibus personis quibuscunque; aliquo in praesentibus contento in contrarium inde non obstante.

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[11] *Sic in* Authentic.

[12] N. B. The Oath of Office may now be taken before *five* only. V. ante, p. 518.

Eo, quod expressa mentio de vero valore annuo vel de certitudine praemissorum sive eorum alicujus, aut de aliis donis sive concessionibus per nos seu per aliquem progenitorum sive praedecessorum nostrorum praefatis Praesidi Concilio et Sodalibus Regalis Societatis de *London*, et successoribus, ante haec tempora factis, in praesentibus minime facta existit; aut aliquo statuto actu ordinatione provisione proclamatione sive restrictione in contrarium inde antehac habitis factis editis ordinatis sive provisis, aut aliqua alia re causa vel materia quacunque, in aliquo non obstante.

In cvivs rei testimonium has Literas nostras fieri fecimus patentes. Teste Me ipso apud Westmonasterium octavo die Aprilis, anno regni nostri vicesimo primo.

Per breve de Privato Sigillo.

PIGOTT[13].

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[13] This Charter is on three sheets of vellum. The first sheet contains an engraved portrait of Charles II., very much inferior in execution to those in the preceding Charters.

IV.

A LICENSE for purchasing in MORTMAIN to the yearly value of One Thousand Pounds, granted to the President, Council, and Fellows of the ROYAL SOCIETY of London, by King GEORGE the FIRST, in the year MDCCXXV.

GEORGE by the Grace of God, of Great Britain, France, and Ireland, King, Defender of the Faith, *etc.* to all to whom these presents shall come, greeting. WHEREAS our trusty and well-beloved the President, Council, and Fellows, of the Royal Society of our City of London for improving natural knowledge, have by their Petition humbly represented unto us, that our late Royal Predecessor, King Charles the Second, by Letters Patents[1], bearing date the Two-and-twentieth day of April, in the Fifteenth year of his reign, did ordain constitute and appoint the said Royal Society of London for improving natural knowledge, and did thereby grant them *Licence to purchase in Mortmain;* that since the grant of the said Letters Patents, several well-disposed Persons have devised and granted to the Petitioners, and their successors, divers lands and hereditaments, and given several sums of money to them, for the use of the said corporation; that the Petitioners being desirous to invest the same money in the most durable manner, for the improvement of the said corporation, have most humbly prayed us to grant to them our Royal Licence to hold and enjoy the lands and hereditaments, which have been devised and granted to them; to purchase hold and enjoy to them, and their successors for ever, for the use and benefit of the said corparation, such manors, lands, tenements, and hereditaments, as they shall think fit to purchase, or shall receive by will, or any deed of conveyance, not exceeding the yearly value of *One thousand pounds:* We are graciously pleased to grant their request. KNOW YE therefore, that we, of our especial grace certain knowledge and meer motion, HAVE given and granted, and by these presents for us our heirs and successors DO give and grant, unto the President, Council, and Fellows of the Royal Society of our city of London for improving natural knowledge aforesaid, and their successors, our especial Licence, full power, and lawful and absolute authority, to hold and enjoy the lands and hereditaments, which have been already devised or granted to the said corporation, as aforesaid; and also to purchase acquire take hold and receive in Mortmain, in perpetuity or otherwise, to or to the use of or in trust for them or their successors, for the use and benefit of the said corporation, from any person or persons, bodies politic and corporate, their heirs and successors respectively, such manors lands tenements rents or hereditaments, as they shall think fit to purchase, or shall receive by writ, or any deed of conveyance, not exceeding the yearly value of One thousand pounds above all charges and reprizes. AND we do hereby also for us our heirs and successors give and grant our especial Licence, full power, and lawful and absolute authority, to any person or persons, bodies politic or corporate, their heirs and successors respectively, to grant, alien, sell, convey, and dispose of in Mortmain, in perpetuity or otherwise, to or to the use of or in trust for the President Council and Fellows of the Royal Society of our city of London for improving natural knowledge aforesaid, and their successors, any manors lands tenements rents or hereditaments whatsoever, not exceeding the yearly value of One thousand pounds. AND LASTLY, we do hereby, for us our heirs and successors, grant unto the President Council and Fellows of the Royal Society of our City of London for improving natural knowledge aforesaid, and their successors, that these our Letters Patents, or the Inrollment or Exemplification thereof, shall be in and by all things good firm valid sufficient and effectual in the law, according to the true intent and meaning thereof; NOTWITHSTANDING the not rightly naming or describing any of the manor lands tenements rents or hereditaments already devised or granted to the said corporation, or to be granted devised aliened or disposed of in Mortmain to them, and their successors, in fee or otherwise, as aforesaid: or any other omission imperfection defect matter cause or thing whatsoever to the contrary thereof in anywise notwithstanding. IN WITNESS whereof we have caused these our Letters to be made Patents. WITNESS Ourself at Westminster, the Seventeenth day of December, in the Eleventh year of our reign.

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[1] *So in the* Original.

" By writ of Privy Seal,
" COCKS.'

V.

STATUTES
OF
THE ROYAL SOCIETY,

Enacted in 1663.

CHAPTER I.

Of the making and repealing of Laws.

I. FOR the making of any Law or Statute of the Royal Society, the draught thereof shall be read in Council, and put to the vote, on two several days of their Meeting. The first day the question to be resolved by vote shall be to this effect, *viz.* "Whether the "draught of the said Statute, then agreed upon, shall be read at "another Meeting?" The second day the question shall be to this effect, *viz.* "Whether the draught of the said Statute, then agreed "upon, shall pass for a Law, or not?"

II. For the repealing of any Law or Statute, or any part thereof, the Repeal shall be propounded and voted in Council, on two several days of their Meeting. The first day the question to be resolved by vote shall be to this effect, *viz.* "Whether the Repeal of such a "Statute, or such part thereof, shall be propounded at another Meeting?" The second day the question shall be to this effect, *viz.* "Whether such a Statute, or such part thereof, shall be repealed or "not?" And in case the said Repeal be agreed unto, the same shall be recorded in the Journal-book of the Council; and the Statute, or part of the Statute repealed, shall be cancelled in the Statute-books.

CHAPTER II.

Of the Obligation to be subscribed.

EVERY Fellow of the Society, and every person elected a Fellow thereof, shall subscribe the Obligation in these words following:

WE, who have hereunto subscribed, do hereby promise each for himself, that we will endeavour to promote the good of the Royal

Society of London for improving natural knowledge, *and to pursue the ends for which the same was founded; that we will be present at the Meetings of the Society, as often as conveniently we can, especially at the Anniversary Elections, and upon extraordinary occasions; and that we will observe the Statutes and Orders of the said Society. Provided, that whensoever any of us shall signify to the President, under his hand, that he desireth to withdraw from the Society, he shall be free from this Obligation for the future.*

And if any Fellow shall refuse to subscribe the said Obligation, he shall be ejected out of the Society. And if any person elected shall refuse to subscribe the same, the election of the said person shall be void; neither shall any person refusing to subscribe be admitted, or registered among the Fellows of the Society.

CHAPTER III.

Of the Payments by the Fellows to the Society.

I. EVERY person admitted a Fellow of the Society shall, on the day of his admission, pay to the use of the Society the sum of Forty shillings, for admission-money. And if any such person shall refuse, or fail to pay the said sum, his election and admission shall be void; except the said sum be remitted in whole, or in part, by special order of the Council.

II. Every Fellow of the Society shall pay One shilling by the week, towards the charges of experiments, and other expences of the Society, so long as he shall continue a Fellow thereof: which continuance shall be accounted from the time of his admission, until such time as he shall signify to the President, under his hand, that he desireth to withdraw from the Society; or until, upon any other account, he shall cease to be a Fellow thereof. And if any Fellow shall refuse to pay according to the rate aforesaid, he shall be ejected out of the Society; except the said Payment be remitted in whole, or in part, by special order of the Council.

III. For the more convenient receiving and collecting the contribution of One shilling by the week, to be paid by every Fellow toward the charges of experiments, and other expences of the Society, the same, amounting to Fifty two shillings by the year, shall be paid quarterly by equal portions, *viz.* by Thirteen shillings at a time for one whole quarter; and proportionably for a part of a quarter, by any person admitted after the beginning, or withdrawing from the Society before the end of any quarter of the year.

IV. The days, upon which the quarterly Payments of the contributions of One shilling by the week to the Society shall become due, shall be the Twenty-third day of September, the Twenty-third day of December, the Twenty-fifth day of March, and the Twenty-fourth day of June.

V. Every Fellow of the Society shall upon each of the weekly Meetings, that shall fall upon the days for the quarterly Payments, or upon the first, second, or third Wednesdays next after each of the said days, bring or send in to the Treasurer, or his Deputy, his quarterly contribution of Thirteen shillings, or such proportion of it as shall be due. And if any Fellow shall fail to bring or send in, as aforesaid (being not dispensed withal, as to the said Payment, by special order of the Council) he shall be liable to ejection out of the Society: upon which the Council shall proceed, as they shall see cause.

CHAPTER IV.

Of the Ordinary Meetings of the Society.

I. THE ordinary Meetings of the Society shall be weekly, upon Wednesday, beginning about three of the clock in the afternoon, and continuing until six; unless the major part of the Fellows present shall, for that time, resolve to rise sooner, or sit later. And no Fellow shall depart, without giving notice to the President.

II. When the President taketh the Chair, the rest of the Fellows shall place themselves orderly, and conveniently for the business of the Meeting; and those persons, that are not of the Society, shall withdraw: Excepting, that it shall be free for any of his Majesty's subjects of England, Scotland, or Ireland, having the title and place of a Baron, or having any higher title and place, or any of his Majesty's Privy Council of any of his three kingdoms, and for any foreigner of eminent repute, with the allowance of the President, to stay for that time; and that it shall be free for any other person, upon leave obtained of the President and Fellows present, or the major part of them, to stay for that time. And the name of every person permitted to stay, of any person that moved for him, and the allowance, shall be entered in the Journal-books.

III. When any Fellow speaketh, he shall address his speech to the President, and be uncovered, and the rest shall be silent.

IV. When two or more offer to speak together, the President shall determine which of them shall speak first.

V. The business of the Society in their ordinary Meetings shall be, to order, take account, consider, and discourse of philosophical experiments and observations; to read, hear, and discourse upon letters, reports, and other papers, containing philosophical matters; as also to view, and discourse upon, rarities of nature and art: and thereupon to consider, what may be deduced from them, or any of them; and how far they, or any of them, may be improved for use or discovery.

CHAPTER V.

Of Experiments, and the Reports thereof.

I. NO Experiment shall be made at the charge of the Society, but by order of the Society or Council.

II. In order to the propounding and making of Experiments for the Society, consideration shall be had of the importance of any Experiment, to the discovery of any truth or axiom in nature, or to the use and benefit of mankind.

III. Two or more Curators shall be appointed (if it may consist with convenience) of every Experiment, or natural Observation, that cannot conveniently be made in the presence of the Society. Which Curators, or any two or more of them, shall (as soon as conveniently may be) meet together at time and place[1] by them agreed on, to make the said Experiment or Observation; and also shall jointly draw up the Report of the matter of fact, in every such Experiment or Observation; or if any difference shall happen between them in their apprehensions thereabout, the same shall be related in the Report.

IV. In all Reports of Experiments to be brought into the Society, the matter of fact shall be barely stated, without any prefaces, apologies, or rhetorical flourishes; and entered so in the Register-book, by order of the Society. And if any Fellow shall think fit to suggest any conjecture, concerning the causes of the *phaenomena* in such Experiments, the same shall be done apart; and so entered into the Register-book, if the Society shall order the entry thereof.

CHAPTER VI.

Of the Election and Admission of Fellows.

I. EVERY person to be elected Fellow of the Society shall first, at one Meeting, be propounded as a Candidate, in order to Election; and after, at some other Meeting (whereat there shall be present a competent number for making Elections) shall be propounded, and put to the vote for Election: Excepting, that it shall be free for every one of his Majesty's subjects of England, Scotland, or Ireland, having the title and place of a *Baron*, or having any higher title and place, and every one of his Majesty's Privy Council of any of the said kingdoms, to be propounded, and put to the vote for Election, on the same day, there being present a competent number for making Elections.

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[1] *So in the* Original.

II. Every Fellow, that is to propound any person as a Candidate, in order to Election, shall, before the said person be propounded, make known unto him the effect of the obligation to be subscribed, and the sum that is to be paid for admission-money, and the rate of the constant payment for the occasions of the Society; and also, at the propounding of the said person, shall satisfy the company that he hath informed him accordingly, and that thereupon it is the desire of the said person to be of the Society.

III. The name of every person propounded as a Candidate, in order to Election for a Fellow of the Society, together with the name of the Fellow proposing, shall be entered in the Journal-book.

IV. In the Election of any person for a Fellow of the Society, the votes shall be taken by way of ballot.

V. Every person, elected a Fellow, shall appear for his admission at some ordinary Meeting of the Society, which shall be within four weeks after his Election; or within such further time as shall be granted by the Society or Council, upon cause shewed to either of them. Otherwise his Election shall be void.

VI. The Admission of any Fellow of the Society shall be at some Meeting thereof, in manner and form following: The President, taking him by the hand, shall say these words,

I do by the authority, and in the name of the Royal Society of London for improving natural knowledge, *admit you a Fellow thereof.*

VII. The Election and Admission of every person into the Society, with the time thereof, shall be recorded in the Journal-book.

CHAPTER VII.

Of the Election of the Council and Officers.

I. AT the two ordinary Meetings of the Society, which shall be within the fifteen days next preceding the day of the Anniversary Elections, the President shall give notice of the said Elections; and declare how much it importeth the good of the Society, that such persons may be chosen into the Council, as are most likely to attend the Meetings and business of the Council, out of whom there may be made the best choice of the President and other Officers.

II. Every Fellow of the Society, in or near London, shall be called to the Anniversary Meetings, for electing the Council and Officers for the year ensuing, by particular summons signed by the President; which summons shall be delivered to every such person, or left at his house or lodging, a week at the least before the said day, together with printed lists of the names of the Fellows of the Society. And the said summons shall be to this effect:—

These are to give notice, that on the day of being the Council and Officers of the Royal Society *are to be elected for the year ensuing; at which Election your presence is expected, at of the clock in the*

III. For the Anniversary Election of the Council (which is to consist of eleven Members of the present Council, to be continued for the year next ensuing; and ten of the Fellows, not being Members of the Council, to be added to them) there shall be a competent number of lists printed of all the Fellows of the Society (excepting all the Members of the present Council) in an alphabetical order; and a competent number of the like lists of all the Members of the present Council; both which lists shall be distributed to all the Fellows of the Society, summoned to the Anniversary Election.

IV. For the Election of the eleven Members of the present Council, to be continued for the year next ensuing, every Fellow shall on the printed list of the present Council, by a line drawn under each name, to the number of eleven and no more, signify the persons to whom he giveth his suffrage for their continuance, as aforesaid; and closing up the said list shall deliver it in to some person appointed to collect and receive the same.

V. All the lists being thus collected, one of the Secretaries shall open them one by one, and in the first place shall take notice of the number of the names distinguished, as is before prescribed, in each list (which if it be above eleven in any, the same list shall be laid aside, and no notice taken of the suffrages therein) and shall recite every name so distinguished; and the other Secretary shall, in a list for that purpose, note how often every several name is recited; and each of the Secretaries shall be assisted by a Scrutator, to be drawn by lot by the President. This done, the Secretaries and Scrutators shall sum up the suffrages, according to the notes affixed to every name: or in case of the absence of one or both the Secretaries, one or two Scrutators more (to be in like manner drawn by lot) shall supply their places; whereof two shall be employed in the perusal of the lists, and recitation of the names, and the other two in the noting of the names recited, as is before prescribed.

VI. After the noting and summing up of the votes, the Secretaries, or Scrutators, shall recite all the names of the present Council having any votes upon the present scrutiny, with the number of the votes to every name; to the end, that all the persons carrying the major part of the votes may be known to be thus elected, if they be not more in number than eleven. But if the persons, having the majority of votes, be more than eleven, he or they (that have fewest suffrages) are to be secluded, until the number be reduced to eleven; or to a lesser number, if equality between persons having the fewest suffrages do so require. And if the persons having the majority of votes, or the persons remaining upon the aforesaid reduction, do not amount to the number of eleven, then all the rest upon that list shall be put to the scrutiny again, and every Fellow shall mark, as before, so many, and no more, as are wanting; and the method thereupon in all things shall be the same, as before, until the number be complete. And in case of equal distribution of votes, the number being greater than the number wanting, the proceeding shall be repeated upon the said persons; and if then they have still equal votes, the President shall seclude one by lot, and the rest shall be put to the scrutiny again.

VII. For the Election of the ten Fellows not of the present Council, to be added to the former eleven, to constitute the Council for the year next ensuing, the proceedings upon the printed lists of the Fellows of the Society shall be in all particulars observed, as upon the former lists, according as the cases shall require.

VIII. In case of seclusion of any Member of the present Council, or of any other Fellow by lot, the same person shall be brought in again to pass the scrutiny, by putting him in competition with one that hath the least, or with more of those that have the least equal number of votes.

IX. Forasmuch as the possible varieties in the equalities, and proportions, of suffrages distributed among several persons, upon which Non-elections may happen, are so great and manifold, that it would be tedious to obviate them all in particular by Statutes: if therefore any case shall happen not provided for, whereupon the Election cannot be made, or perfected, the same shall be adjourned to the next convenient time; and the Council in the interim shall make provision, and offer some expedient to the Society, for the effecting thereof.

X. For electing the President, Treasurer, and Secretaries, every Fellow present at the Anniversary Election of the Council shall, after the Election made for the Members of the new Council, put upon a distinct list several marks, first for the President, next for the Treasurer, and then for the Secretaries, to be chosen severally out of the said new Council, for the year following; and the proceedings therein shall be after the same manner, as is directed for the Anniversary Elections of the Council.

XI. For electing any Member of the Council, or any Officer to be elected by the Society, upon such vacancies, as shall happen in the intervals of the Anniversary Elections, the summons for such Election, and the proceedings in it, shall be after the same manner, as is directed for the Anniversary Elections.

XII. Upon the vacancy of the President's place, which shall happen in the intervals of the Anniversary Elections, one of the Secretaries shall cause the Council to be summoned for the Election of a new President; and the Council meeting thereupon in the usual place, or any eleven or more of them, shall proceed to the said Election, and not separate until the major part of the number aforesaid shall have agreed upon a new President.

CHAPTER VIII.

Of the President.

I. THE business of the President shall be, to preside in all the Meetings, and regulate all the debates, of the Society and Council; to state and put questions both in the affirmative and negative, according to the sense and intention of the Meeting; to call for Reports and Accounts from Committees, Curators, and others; to check irregularities, and to keep all persons to order; to summon all extraordinary Meetings of the Society and Council, upon any urgent occasions; and to execute, or see the execution, of the Statutes of the Society

II. Whensoever any question shall be desired to be put by any Fellow, at any Meeting of the Society or Council, and seconded by another, the President shall put the same; unless upon debate the sense of the Meeting appear to be otherwise.

III. The President shall take place of every Fellow of the Society, within their college, or ordinary place of meeting; as also in all other places, where any number of the Fellows meet as a Society, or Council, or Committee; and being in the Chair is to be covered, while speaking unto or hearing particular Fellows, notwithstanding their being uncovered.

IV. The President shall not preside at any Meeting of the Fellows of the Society, except the ordinary Meetings of the Society or Council, at known time and place[2]; or such extraordinary Meetings of either as shall be called by a general summons of each respectively; or the Meetings of Committees appointed by the Society or Council; and except Meetings for solemnities only.

CHAPTER IX.

Of the Treasurer and his Accompts.

I. THE Treasurer, or his Deputy, shall receive to the use of the Society all moneys, or sums of money, due or payable to the Society; and out of such moneys shall pay and disburse all moneys, or sums of money, due from or payable by the Society, upon all occasions; and shall keep particular Accompts of all such receipts and payments.

II. Every sum of money, payable to the use of the Society, of Five pounds or under, shall be paid by order of the President, under his hand; and every sum exceeding Five pounds shall be paid by order of the Council, signed by the President, and registered by the Secretary; and all bills of charges for experiments shall be signed by the Curators thereof, before they be presented to the President.

III. All moneys, or sums of money, whereof there shall not be present occasion for expending or disposing to the use of the Society, shall be laid up in an iron chest, having three different locks and keys, whereof one shall be in the custody of the President, another of the Treasurer, and a third of one of the Secretaries: and the Treasurer shall not have in his custody above Twenty pounds at once, for defraying the occasional expences of the Society; and accordingly he shall pay in moneys into the chest aforesaid, and take out of the same, by order of the Council, as they shall judge expedient.

IV. The Treasurer shall have and keep a roll or list in parchment of the Fellows of the Society, with a margin before and after the names; in the former whereof shall be noted the arrears due from every Fellow, in the latter the receipts and payments of the Fellows, according to the weekly or quarterly contribution to the

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[2] *So in the* Original.

Society; and the said roll shall be signed by him, for attesting the truth thereof.

V. Upon the third Wednesday which shall be next after each of the quarter-days, the Treasurer, or his Deputy, shall demand the quarterly payments or arrears of every Fellow, from whom the same shall be due; and forthwith after the said Wednesday shall send a Collector, appointed under his hand and seal, with the roll or list of the Fellows of the Society signed by him, wherein the arrears due from every Fellow are noted in the margin before the names, for the collecting of the said arrears.

VI. The Accompts of the Treasurer shall be audited and examined four times a year, within six weeks after each quarter-day, by a Committee of five of the Council, or any three or more of them, whereof the President and one of the Secretaries shall be two. And the same shall be done once a year before the Anniversary Elections, by a Committee to be nominated by the President, with the consent of the major part of the Fellows present, given by ballot, at one of the three next preceding weekly Meetings of the Society; which shall consist of Fellows that are not Members of the Council, to the number of five, whereof any three or more shall be a *Quorum*, who shall make their report to the Society, upon the Meeting next before the Anniversary Election, or upon the day of the said election.

CHAPTER X.

Of the Secretaries.

I. THE Secretaries, or either of them, shall have the charge and custody of the Charter-book, Statute-book, Journal-books of the Society and Council, Register-books and Letter-books of the Society, as also of all papers and writings belonging to the Society; any of which they shall cause to be produced at any Meetings of the Society or Council, as the case shall require, or as they shall be ordered so to do by the Society or Council.

II. The Secretaries, or either of them, shall have inspection over the Clerk, and shall give order and direction to him, concerning the entering and writing of all matters in the Journal-books of the Society or Council, the Register-books, or any other books of the Society, also concerning any orders or other writings for the use and service of the Society.

III. The Secretaries, or either of them, shall attend at all Meetings of the Society and Council; where, when the President hath taken the Chair, one of them shall read the orders and entries of the next preceding Meeting, and shall after take notes of the orders and material passages of the present Meeting, to be entered by the Clerk in the respective books, to which they relate; and when there shall be present a competent number for making elections, they, or either of them, shall give notice of any Candidates that shall stand propounded in order to election into the Society.

IV. The Secretaries, or either of them, shall draw up all letters to be written to any persons in the name of the Society or Council (to be read and approved of in some meeting of either respectively) except, for some particular cause or consideration, some other person be appointed by the Society or Council to draw up any such letter.

CHAPTER XI.

Of Curators by Office.

I. WHEREAS the ends of the institution of the Society may be most effectually promoted by employing able and fit persons, who shall be Curators by office, for the service and business of the Society, having such a liberal allowance, as may be a sufficient maintenance for them, without seeking for or engaging in any other employment; therefore when the Society shall be endowed with a standing revenue, that can bear it, provision shall be made for such Curators accordingly. And because it may happen, that some persons, engaged in other employments, may yet be of eminent usefulness for the business of Curators; therefore if any such shall be employed by the Society, such allowance shall be made, as may be proportionable to the time bestowed in that service: Provided that the allowance to any one Curator shall not exceed so much as shall from time to time be equivalent to Two hundred pounds *per annum*, in this present year 1663. Nor shall the number of such Curators be so great, as to exhaust upon their said allowances above one half of the revenue, from time to time belonging to the Society.

II. The employment and business of a Curator shall be, to take care of the managing of all experiments and observations appointed by the Society or Council, and report the same; and to perform such tasks relating to the ends of the constitution of the Society, as the Society or Council shall from time to time appoint; such as the examining of sciences, arts, and inventions, bringing in histories of natural and artificial things.

III. Every person, to be chosen a Curator by office for the Society, shall be of good fame and virtuous conversation, knowing in philosophical and mathematical learning, addicted to and well versed in observations, inquiries, and experiments concerning natural and artificial things.

IV. Every person, standing for the office of a Curator to the Society, shall be propounded at some Meeting thereof, one month at the least before the intended election; to the end, that every Member may inform himself concerning him, and acquaint the Society or Council with any exception or objection against him: and every such person shall submit himself to the trial and examination of the Council, or of such persons as shall be appointed by them, to be transacted in the presence of the Council, concerning his qualifications, whether they be such as are required in a Curator.

V. Whensoever any person is to be tried and examined before the Council, in order to election for the office of a Curator to the Society, and whensoever any such person is to be recommended from the Council to the Society for the said election, every Member of the Council shall be summoned to the Meeting, with express notice of the occasion thereof.

VI. Every person, propounded to the Society for the office of a Curator, shall, before his examination by the Council, visit every Member thereof in or near London, declaring to him his desire and intention for the said place; except such visitation be dispensed with by order of the Society or Council.

VII. Every person, approved by the Council for a Curator to the Society, shall be recommended from the Council to the Society, in order to election, at some Meeting a week or longer before the intended election-day; and if any person proposed, and not approved or recommended, shall find himself aggrieved, or think that right hath not been done him, it shall be free for him to appeal, or make his case known to the Society.

VIII. Every person, propounded to the Society for election into the office of a Curator, shall at the first be elected for one year of probation only (except the Society shall by vote taken by ballot resolve otherwise, in consideration of the known merit of any particular person), and at the end of that year the said person shall either be elected for perpetuity, or for a longer time of probation, or shall be rejected.

IX. In order to the election of persons for Curators, the Fellows of the Society shall be summoned, in the same manner and form, *mutatis mutandis*, as is provided for the Anniversary Election of the Council and Officers.

X. The election of every person for a Curator shall be after this manner: The names of all the competitors for a Curator's place shall first be read, and then be put to the ballot, in order as they stand recommended by the Council to the Society, adding such as, upon appeal, shall be ordered by the Society: and when any one hath the plurality of suffrages, he shall stand elected, without any further proceeding upon any other of the competitors; and the like method shall be for every vacant place: and in case of non-election it shall be resolved by the Society, whether there shall be a proceeding again upon the same person or persons at that Meeting, or an adjournment of the election to another day.

XI. For the electing of a Curator for a longer time of probation, or for perpetuity, the same rules concerning the summons for the Meetings shall be observed, as in election for probation; and the question shall be determined by the major part of the votes taken by ballot.

XII. Every person elected Curator by office, shall also be a Fellow of the Society, and shall subscribe the obligation to be subscribed by every Fellow; and be admitted Fellow in the usual form, if he were not so before; neither shall he continue a Curator any longer than he shall continue a Fellow of the Society.

XIII. Every Curator of the Society shall forfeit his place as a Curator, together with his relation as a Fellow, for any of the causes for which a Fellow is to be ejected; and also for any fraudulent dealing in matters concerning the Society, or for negligence in the business of his place: before which ejection, for the first, second, and third fault, he shall receive respective admonishment by the President in Council, to be entered in the Council-book; except the fault shall be judged by the Society so enormous as to deserve a present expulsion.

XIV. If any Curator shall be disabled by age, infirmity, or casualty contracted in the service of the Society, some provision shall be made for him during life, if the necessity of his condition shall so require, according as the Council shall think fit.

CHAPTER XII.

Of the Clerk.

I. THE Clerk of the Society shall constantly attend all the Meetings of the Society and Council, precisely at the hour appointed, and not go away before the Meeting be dissolved; and he shall follow the directions of the Secretaries in registering all matters, that shall be ordered to be entered, in the respective books of the Society.

II. The Clerk shall not suffer any person, being no Member of the Society, to read any book, record, or other writing, or any part thereof, belonging to the Society; nor give any copies thereof, nor any way communicate any thing contained therein, to any such person: and in case he shall do contrary thereunto, he shall forfeit his place.

III. The Clerk shall have Sixpence for every page in *folio*, of thirty lines fairly and closely written, with a margin not exceeding one fourth part of the page; and according to the same rate for any larger or smaller page: and he shall have Ten pounds by the year for his attendance at Meetings, to be paid quarterly by equal portions.

CHAPTER XIII.

Of the Printer to the Society.

I. THE office of the Printer shall be to take care for the printing and vending such books, besides catalogues, and such other things, as shall be committed to him by order of the Society or Council; in the doing of which he shall from time to time observe, and submit unto the directions and orders of the Council, both as to the correctness of the edition, the number of copies to be printed, the form or volume, the goodness of the paper, character, figures and diagrams, as likewise the price at which such books are to be sold; nor shall he reprint any of the said books, or print them in any translation or epitome, without particular leave from the Council. And if in any of these particulars he shall neglect, or disobey the directions of the Council, he shall either give such satisfaction for his default, as the Council shall approve, or else be put out of his place.

II. The Printer shall present of every book he prints by order of the Society or Council, two copies, extraordinary well bound, to his Majesty: one copy to Edward Earl of Clarendon, Lord Chancellor; one copy to the President of the Royal Society; two copies to the library of the said Society, each of them fairly bound: and one copy more to each of the Secretaries of the said Society.

CHAPTER XIV.

Of Operators to the Society.

I. WHENSOEVER, and as long as, an Operator to the Society hath any work to do for the Society, he shall do no work for any other person, that may hinder his perfecting of that within the time limited, or requisite to have it finished.

II. An Operator, working for the Society, shall use all care and diligence to dispatch all work for the Society, in as short a time as the same can be so well and substantially done, as the nature of the thing requireth.

III. If any Operator shall in any bill or reckoning defraud, or endeavour to defraud the Society, he shall forfeit his place or relation to them thereby.

IV. An Operator shall have Ten pounds by the year, for his attendance at all the ordinary Meetings of the Society, as a constant salary, to be paid quarterly at equal portions.

CHAPTER XV.

Of the Common Seal and Deeds.

I. THE Common Seal of the Society shall be kept in an iron chest, having three locks, with three different keys; whereof one shall be in the custody of the President, the other[3] of the Treasurer, and the third of one of the Secretaries.

II. Every Deed or writing, to which the common Seal is to be affixed, shall be passed and sealed in Council, and signed by the President on the fore part near the label, and signed on the back side by the rest of the Members of the Council present.

CHAPTER XVI.

Of the Books of the Society.

I. THERE shall be had and kept one Book, called the Charter-book, wherein shall be fairly written the copy of the Charter, all his Majesty's Grants on the behalf of the Society, the Obligation and Subscriptions thereto of the Fellows of the Society, all the Statutes of the Society, the names and titles of all the Benefactors to the Society with their donations, as also the Register of all the Fellows of the Society.

II. There shall be had and kept a Book, called the Statute-book, wherein shall be fairly written the Charter of the Society; all the Laws, Statutes, and Constitutions made, or to be made, concerning the government and regulating of the Society or Council; as also a duplicate of the Register of the Fellows of the Society.

III. There shall be had and kept Journal-books for the Society, and Council; wherein shall be entered all the orders and remarkable passages of the Society, and Council, at their respective Meetings.

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[3] *So in the* Original.

IV. There shall be had and kept Register-books, wherein shall be fairly written all such observations, histories, and discourses of natural and artificial things, as shall be ordered to be entered; as also all such philosophical experiments, together with the particular accounts of their processes, as shall be ordered to be entered therein.

V. There shall be had and kept a Book of Letters, wherein shall be fairly written all such letters, and extracts of letters, of the Society, or to the Society, or to any Member thereof, concerning philosophical matters, as shall be ordered to be entered.

VI. No Fellow shall give any copy or transcript of any matter contained in the Register-books, or other Books of the Society, to any one that is not a Member thereof; nor communicate the same to any such person to be transcribed, without particular leave obtained at a Meeting of the Society; except the said matter were originally brought in, or communicated by himself.

CHAPTER XVII.

Of Benefactors.

EVERY Benefactor to the Society, whose gift amounts to the value of Five pounds or more, shall have his name registered in the Catalogue of Benefactors, with the mention of his gift. And every Benefactor, that shall present the Society with any sum of money or gift, to the value of Fifty pounds sterling or more; or shall procure any advantage, that shall be estimated by the Society to be of the like value; upon acceptance shall, without election, have the privilege of being present at the Meetings of the Society, and shall not be obliged to payments. And if any of the Fellows of the Society shall present to the same the like gift, or sum of money, he shall not be obliged to payments for the future.

CHAPTER XVIII.

Of the Death or Recess of any Fellow.

UPON the Death, or the voluntary withdrawing, of any Fellow of the Society, one of the Secretaries shall note such their Death or Recess in the margin of the Register, against their names[4];

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[4] *So in the* Original.

and the Withdrawing of any Fellow shall be recorded in the Journal-book.

CHAPTER XIX.

The Form and Causes of Ejection.

I. WHENSOEVER there shall be cause for the Ejection of any Fellow out of the Society, the President shall at some Meeting thereof cancel his name in the Register, and at the same time pronounce him ejected in these words :—

I do by the authority, and in the name of the Royal Society of London for improving natural knowledge, *declare* A. B. *to be now ejected, and no longer a Fellow thereof.*

And the Ejection of every such person shall be recorded in the Journal-book.

II. If any Fellow of the Society shall contemptuously, or contumaciously, disobey the Statutes or Orders of the Society ; or shall by speaking, writing, or printing, publicly defame the Society ; or advisedly, and maliciously, do any thing to the damage and detriment thereof, he shall be ejected out of the Society.

VI.

STATUTES
OF
THE ROYAL SOCIETY.

Enacted in 1847.

CHAPTER I.

Of the Election and Admission of Fellows.

I. NO person shall be proposed, elected, or admitted a Fellow of the Society on the day of the Anniversary Meeting for electing the Council and Officers.

II. Every Fellow, previously to his proposing a person as a Candidate for election, shall inform him of the Obligation to be subscribed, of the sum to be paid for admission money, and of the payments to be made to the Society, before he can be admitted a Fellow.

III. Every such Candidate shall be proposed and recommended by a certificate in writing signed by six or more Fellows, of whom three at least shall certify their recommendation from personal knowledge. The certificate shall specify the name, rank, profession, qualifications, and usual place of residence of the Candidate; and being delivered to one of the Secretaries, shall be entered in a book to be kept for the purpose, with the date of delivery and particulars as stated thereon.

IV. Any one of Her Majesty's subjects, who is a Prince of the Blood Royal, or a Peer of the United Kingdom, or one of her Majesty's Privy Council, and any Foreign Sovereign Prince, or the Son of a Sovereign Prince, may, nevertheless, be proposed at one of the ordinary Meetings of the Society by any one Fellow, and upon being seconded by another Fellow, may be put to the Vote for Election on the same day, provided public notice of such proposition shall have been given by the proposer at the preceding Meeting of the Society.

V. At the first ordinary Meeting of the Society in March 1848, the names of all Candidates duly proposed after the first day of March 1847, and in subsequent years at the first ordinary Meeting in March, the names of all Candidates proposed subsequently to the first Meeting in March of the preceding year, shall be announced by the Secretary from a list arranged in alphabetical order, without reference to the dates of the certificates of the Candidates; and these certificates shall be suspended in the Meeting-room until the day of Election.

VI. In the first week in April, a list shall be printed, containing the names of all the Candidates so announced at the first Meeting in March, arranged in alphabetical order without reference to the dates of the certificates, together with the names of the Fellows by whom each Candidate is proposed and recommended; and a copy of such list shall immediately thereafter be sent to every Ordinary Fellow.

VII. The Council shall select by ballot from such printed list of Candidates a number not exceeding fifteen, to be recommended to the Society for election; but no such selection by the Council shall be valid unless eleven Members at least be present and vote, a majority deciding, or in the event of equality the President or his deputy having a casting vote.

VIII. At the first ordinary Meeting of the Society in May, the President, or his deputy, shall read from the Chair the names of the Candidates whom the Council have selected as most eligible, arranged in alphabetical order; and after such Meeting, a circular letter shall be forthwith sent to every Fellow, naming the day and hour of election, and enclosing a printed list of the selected Candidates, with space for such alterations as any Fellow may determine to make in pursuance of Statute X.

IX. The election of Ordinary Fellows, not included in the privileged classes referred to in Statute IV. of this Chapter, shall take place on the first Thursday of June; unless the Council shall alter the day of Election to any other day in the month of June, in which case due notice of such alteration shall be given to every Ordinary Fellow.

X. On the day of Election two Scrutators shall be nominated by the President, with the approbation of the Society, to assist the Secretaries in examining the lists; and each Fellow present and voting, shall deliver to one of the Secretaries or Scrutators, one of the printed lists mentioned in Statute VIII., having erased the name of any Candidate or Candidates for whom he does not vote, and, if he shall have thought fit, having substituted or added the name of any other Candidate or Candidates contained in the printed list sent in pursuance of Statute VI. of this Chapter.

XI. One of the Secretaries shall take down the names of the Fellows who vote, and the Scrutators, after examining the lists with the Secretaries, shall report to the President or his deputy the names of the Candidates who shall have been duly elected in compliance with the Charters, and the President or his deputy shall announce those names from the Chair.

XII. Any Candidate announced at the first ordinary Meeting of the Society in March, as aforesaid, who shall not have been elected, shall, if his proposers so desire, continue a Candidate; his name shall be placed in alphabetical order with those of the new Candidates to be announced in March following, without reference to the date of his Certificate; and his Certificate shall be suspended in the Meeting-room in the same manner as those of the new Candidates.

XIII. Every person who is elected a Fellow shall appear for his admission on or before the fourth ordinary Meeting of the Society after his Election, or within such further time as shall, for some sufficient cause, be granted by the Council: otherwise his Election shall be void.

XIV. The Admission of any Fellow into the Society shall be at some ordinary Meeting, in manner and form following, he having first made the payments required by the Statutes. Immediately after the reading of the Minutes has been concluded, he shall subscribe the Obligation in the Charter-book, and be introduced to the President, who, taking him by the hand, shall say these words: *I do, by the authority, and in the name, of the Royal Society of London, for improving natural knowledge, admit you a Fellow thereof.*

XV. The Election, the payments made previous to admission, and the admission of every person into the Society, with the time thereof, shall be recorded in the Journal-book.

XVI. No person shall be deemed a Fellow of the Society until he has made the payments required by the Statutes: nor shall he be entitled to vote at any election or Meeting of the Society until he shall have been admitted in the manner and form above specified.

XVII. Persons may be elected into the Society, under the title of Foreign Members, who are neither natives nor inhabitants of Her Majesty's dominions, and shall be exempted from certain obligations which the ordinary Fellows are enjoined by the Statutes to perform; they shall be selected from among men of the greatest eminence for their scientific discoveries and attainments.

XVIII. The Council shall from time to time, as they shall see fit, put in nomination persons for election as Foreign Members, not exceeding, with those already elected, the number of fifty.

XIX. Notice of such nomination shall be immediately forwarded, in writing, to each Member of the Council; and the opinion of the Council respecting the eligibility of any Candidate, as Foreign Member, shall be taken by ballot at a subsequent Meeting of the Council, which Meeting shall not be held within less than one month after the first nomination of the Candidate; when, if two-thirds of the Members of the Council present be in favour of the nomination, the Candidate shall be proposed at the next ordinary Meeting of the Society, and shall be put to the vote at the following ordinary Meeting.

CHAPTER II.

Of the Obligation to be subscribed.

EVERY person elected a Fellow of the Society shall, before his admission, subscribe the Obligation in the following words:

We who have hereunto subscribed, do hereby promise each for himself, that he will endeavour to promote the good of the Royal Society of London, for improving natural knowledge, and to pursue the ends for which the same was founded; that we will be present at the Meetings of the Society, as often as conveniently we can, especially at the Anniversary Elections, and upon extraordinary occasions; and that we will observe the Statutes and Orders of the said Society. Provided, that whensoever any of us shall signify to the President under his hand, that he desireth to withdraw from the Society, he shall be free from this Obligation for the future.

And if any person elected shall refuse to subscribe the said Obligation, the election of that person shall be void.

CHAPTER III.

Of the Payments to be made by the Fellows to the Society.

I. EVERY person elected a Fellow of the Society shall, before he is admitted, pay the sum of *ten pounds* for Admission-money. And if any such person shall refuse or fail to pay the said sum, he shall not be admitted, and his election shall be void; except the said sum be remitted in whole, or in part, by special order of the Council.

II. Every person elected a Fellow, shall, besides the Admission money, further pay in advance *four pounds per annum,* as long as he shall continue a Fellow of the Society.

III. All who were Fellows of the Society before December the 11th, 1834, may at any time compound for their annual payments, by paying at once, as hitherto, the sum of *Forty pounds.*

IV. All who have, or may become Fellows of the Society after December the 11th, 1834, may at any time compound for their annual payments, by paying at once the sum of *Sixty pounds.*

V. All who have become Fellows of the Society after December the 11th, 1834, and who have contributed a Paper, which has been printed in the *Philosophical Transactions*, shall have the privilege of compounding for their annual contributions for the sum of *Forty pounds.*

VI. Every Fellow of the Society liable to an annual payment shall bring or send the same to the Treasurer, or the Assistant Secretary. And if any such Fellow shall fail to pay the same before the first day of November in each year, his name shall be suspended in the Public Meeting-room of the Society as being in arrear, and shall continue so suspended until the sum due be paid. And if any such Fellow shall fail to pay his subscription on or before the Meeting of the Society next preceding St. Andrew's Day, no satisfactory reason having been assigned to the President and Council for such non-payment, he shall cease to be a Fellow of the Society. Provided, nevertheless, that on a solicitation for re-admission being addressed to the President and Council by an individual so circumstanced, within the space of one year following St. Andrew's Day, the case of the individual so soliciting shall be stated by the President from the Chair at one of the ordinary Meetings of the Society, and the question of his re-admission be put to the vote at the next Meeting of the Society.

CHAPTER IV.

Of the Death or Recess of any Fellow.

THE Death or Recess of any Fellow of the Society shall be recorded in the Journal-book of the Society, and the names of such persons announced from the Chair, at the Anniversary Meeting for electing the Council and Officers.

CHAPTER V.

Of the Causes and Form of Ejection.

I. IF any Fellow of the Society shall contemptuously or contumaciously disobey the Statutes or Orders of the Society or Council; or shall, by speaking, writing, or printing, publicly defame the Society; or advisedly, maliciously, or dishonestly, do anything to the damage, detriment, or dishonour thereof, he shall be ejected out of the Society.

II. Whensoever there shall appear to be cause for the ejection of any Fellow out of the Society, the subject shall be laid before the Council; and if a majority of the Council shall, after due deliberation, determine by ballot to propose to the Society the ejection of the said Fellow, the President shall in that case, at some ordinary Meeting of the Society, announce from the Chair such determination of the Council; and at the Meeting next after that at which the said announcement has been made, the Society shall proceed to determine the question; and on its appearing that two-thirds of the Members present have voted for the ejection of the said Fellow, the President shall proceed to cancel his name in the Register, and at the same time pronounce him ejected in these words:—

> *I do, by the authority and in the name of the Royal Society of London, for improving natural knowledge, declare* A. B. *to be now ejected, and no longer a Fellow thereof.*

And the Ejection of every such person shall be then recorded in the Journal-book of the Society; and his name, as ejected, be also read at the next Anniversary Meeting for elections.

CHAPTER VI.

Of the Election of the Council and Officers.

I. AT the two ordinary Meetings of the Society, next preceding the day of the Anniversary Election, the President shall give notice of the said Election; and declare how much it imports the good of the Society, that such persons may be chosen into the Council, as are most likely to attend the Meetings and business of the Council, out of whom there may be made the best choice of a President and other Officers.

II. Every Fellow of the Society, in or near London, or within what was formerly the limit of the three-penny post, and whose residence is known, shall have notice of the Anniversary Meeting for electing the Council and Officers for the year ensuing, by particular summons, which summons shall be sent to the place of residence of such Fellow, a week at the least before the day of Meeting; and shall be to this effect:—

> *These are to give notice, that on the day of the Council and Officers of the* ROYAL SOCIETY *are to be elected for the year ensuing; at which Election your presence is expected, at of the clock in the precisely.*

III. The Council for the ensuing year, out of which shall be chosen the President, Treasurer, Principal Secretaries, and Foreign Secretary, shall consist of eleven Members of the existing Council, and of ten Fellows who are not Members of the existing Council[1].

IV. The President and Council shall, previous to the Anniversary Meeting, nominate, by ballot, eleven Members of the existing Council, and also ten Fellows, not Members of the existing Council, whom they recommend to the Society for election into the Council for the ensuing year. The President and Council shall, also, in like manner, nominate, by ballot, out of the proposed Council, the persons whom they recommend to the Society for election to the offices of President, Treasurer, Principal Secretaries, and Foreign Secretary, for the ensuing year.

V. At the ordinary Meeting of the Society preceding the Anniversary Meeting, the names of such persons so recommended for election as Council and Officers for the ensuing year, shall be announced from the Chair.

VI. Lists, with the names of the Fellows recommended by the President and Council, and having a blank column opposite for such alterations as any Fellow may wish to make, shall be prepared for the use of the Fellows, one week before the day of election.

VII. Two Scrutators shall be nominated by the President, with the approbation of the Society, to assist the Secretaries in examining the lists.

VIII. Each Fellow voting, shall deliver his list to one of the Secretaries or Scrutators; and the name of each Fellow who shall so deliver in his list, shall be noted by one of the Secretaries.

IX. The Scrutators, after examining the lists with the Secretaries, shall report to the Society the names of those having the majority of votes for composing the Council, and filling the offices of President, Treasurer, Principal Secretaries, and Foreign Secretary; the names of which persons shall then be announced from the Chair.

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[1] At present one half of the Members of Council go out by rotation.

X. For electing any Member of the Council, or any Officer to be elected by the Society, upon such vacancies as shall happen in the intervals of the Anniversary Elections, the summons for such Election, and the proceedings in it, shall be after the same manner as is directed for the Anniversary Election.

XI. Upon any vacancy of the President's place, occurring in the intervals of the Anniversary Elections, the Treasurer, or in his absence one of the Secretaries, shall cause the Council to be summoned for the Election of a new President: and the Council meeting thereupon in the usual place, or any eleven or more of them, shall proceed to the said Election, and not separate until the major part of them shall have agreed upon a new President.

CHAPTER VII.

Of the President.

I. THE business of the President shall be to preside at all the Meetings, and regulate all the debates, of the Society, Council, and Committees; to state and put questions both in the affirmative and negative, according to the sense and intention of the Meetings; to call for reports and accounts from Committees, and others; to check irregularities, and to keep all persons to order; to summon all Meetings of the Council, and Committee of Papers; and to execute, or see to the execution of, the Statutes of the Society.

II. The President shall take precedence of every Fellow of the Society, at their ordinary place of meeting; and also in all other places, where any number of the Fellows meet as a Society, Council, or Committee; and, being in the Chair, shall be covered, while speaking to or hearing particular Fellows, notwithstanding their being uncovered.

CHAPTER VIII.

Of the Treasurer and his Accounts.

I. THE Treasurer, or some person appointed by him, shall receive for the use of the Society all sums of money due or payable to the Society; and shall pay and disburse all sums due from or payable by the Society; and shall keep particular Accounts of all such receipts and payments.

II. Every sum of money payable on account of the Society exceeding Ten Pounds, shall be paid only by order of the Council:

but payments for rates or taxes, to any amount, may be made by the Treasurer, without any specific order of the Council for that purpose.

III. All sums of money, which there shall not be present occasion for expending, or otherwise disposing of to the use of the Society, shall be laid out in such Government or other securities as shall be approved of and directed by the Council.

IV. The Treasurer shall keep a yearly account of all such Fellows of the Society as pay the sum appointed as the composition in lieu of annual payments; and also of those who make the annual payments: and in this account shall be noted the times up to which the annual payments have been made, and the arrears due from each Fellow.

V. The Treasurer shall also keep a book of Cheque Receipts for annual payments, each Receipt to be signed by himself, and to be filled up with the name of the Fellow paying, the sum paid, and the time for which payment is made: these Receipts to be undersigned by the person who shall receive the money on the Treasurer's behalf, who, upon the delivery of the Receipt to the Fellow paying, is to enter upon that part of the Check which is left in the Book, the above particulars, and also the day of payment.

VI. The Treasurer shall demand, or cause to be demanded, all arrears of annual payments, as soon as convenient after the first day of May.

VII. The Accounts of the Treasurer shall be audited annually, a short time preceding the Anniversary Elections, by a Committee consisting of five Members of the Council, of whom the President and the Senior Secretary (or in his absence the Junior) to be two; and of five Fellows of the Society not Members of the Council, who are to be nominated by the President, with the consent of the major part of the Fellows present, given by ballot at one of the three next preceding weekly Meetings; any three or more of the said five Members of the Council, whereof the President and one of the Secretaries shall be two, together with any three or more of the said five Fellows, shall be a Quorum of the said Committee: the Members of the said Committee who are of the Council shall make their report to the Council held next after such Audit, on or before the Anniversary Election; and the Members of the said Committee who are not of the Council shall make the Report to the Society, upon the Meeting next before the Anniversary Election, or on the day of the said Election.

VIII. The Treasurer shall have the charge of the Title Deeds of the Society's Estates, the Bonds formerly given by the Fellows, the Policies of Insurance, and Securities.

IX. As soon after the Audit as may be, and before the Anniversary Meeting, the Treasurer shall cause an Abstract of the Society's Accounts of the preceding year to be printed for the use of the Fellows.

CHAPTER IX.

Of the Secretaries.

I. THE Secretaries, or either of them, shall have inspection over the Assistant-Secretary; and shall give the Orders and Directions concerning the entering and writing of all Minutes or matters in the Journal-books of the Society or Council, or any other books of the Society; and also concerning any orders or other writings for the use and service of the Society.

II. The Secretaries shall attend all Meetings of the Society, Council, and Committees of Papers; where, when the President has taken the Chair, the Senior Secretary shall read the Minutes, Orders, and entries of the preceding Meeting; and shall afterwards take minutes of the business and orders of the present Meeting, to be entered by the Assistant-Secretary in the respective books to which they relate.

III. At the Meetings of the Society, the Junior Secretary shall announce the Presents made to them since the last Meeting; shall give notice of any Candidate who stands proposed for election into the Society at that Meeting; and shall read the Letters and Papers presented to the Society in the order of time in which they shall have been received, unless the President shall otherwise direct.

IV. The Secretaries, or either of them, shall draw up all letters to be written to any persons in the name of the Society or Council, (to be read and approved of in some meeting of either respectively,) except, for some particular cause or consideration, some other person be appointed by the Society or Council to draw up any such letter. They shall likewise have the charge (under the direction of the Committee of Papers) of printing the *Philosophical Transactions* and correcting the Press.

V. The letters relating to the business of the Society, received during each Session, shall be arranged and kept in the Apartments of the Society.

VI. The duty of the Secretary for Foreign Correspondence shall be to receive and answer all letters from foreign parts relating to the business of the Society, to return thanks for presents from Foreigners made to the Society, and to forward to persons elected Foreign Members, the Diplomas certifying their election into the Society.

CHAPTER X.

Of the Assistant-Secretary.

I. THE person who shall be chosen to the office of Assistant-Secretary, shall either not be a Fellow of the Society; or, if a Fellow, shall cease to be so, upon his Election to, and acceptance of that office.

II. The appointment of a person to the office of Assistant-Secretary, shall be by the Council, to whom the officer so appointed shall give security, at the discretion of the Council; and he shall reside in the Society's House.

III. The Assistant-Secretary shall be paid for his services, according to the determination of the Council; and shall not, besides such payments, receive any perquisite or profit whatsoever. He shall be further subject to such Rules and Orders as shall from time to time be made or given by the President and Council, besides those annexed to the duty of his office; and he shall constantly be in attendance, during all Meetings of the Society, Council, and Committees.

IV. He shall enter all the Minutes in the several Journal-books, and make an Index to every such book: he shall lay before every Council their fair Minute-book; and before every Committee of Papers, the Society's Journal-book, to show that the several entries are fairly made: and he shall have the care of the writing of all Summonses of the Society, Council, and Committees.

V. He shall, under the direction of the Secretaries, have the charge and custody of the Charter-book, Statute-book, Journal-books of the Society and Council, Register-books, and Letter-books, as also of all Papers and Writings belonging to the Society; all which shall be kept in the house of the Society, that they may be in readiness to be produced at any Meetings of the Society or Council, as the case may require, or as shall be ordered by the Society, Council, or President.

VI. He shall not suffer any person, not being a Fellow of the Society, to read any Journal-book, Record, or Writing, or any part thereof, belonging to the Society; nor give any copy thereof, nor any way communicate anything contained therein, to any such person.

VII. He shall follow the directions which may be given him from time to time by the Treasurer. He shall enter in a Book, to be provided by the Treasurer, all such sums as he may receive on account of the Society at the instant of receiving such sums; and for these sums, so entered by him, he shall be answerable, until he shall have paid them to the Treasurer.

VIII. He shall attend the Library every day that it is open, from Eleven in the morning to Four in the afternoon, for the accommodation of such Fellows of the Society as shall come to read the printed books or manuscripts, and of any other persons who shall bring a written permission from the President or any other Member of the Council, or who shall be introduced by a Fellow in person.

IX. He shall mark with the stamp of the Society, all books presented to, or bought by, the Society, immediately after their coming into the possession of the Society, and before they are laid on the Society's Table; and he shall so place them as to be readily found.

X. He shall receive from the Printer all the copies of the *Philosophical Transactions;* and deliver out one copy to each Fellow who shall ask, or send for it at the House of the Society.

XI. He shall keep a Book, in which shall be entered an Account of the number of the *Transactions* printed, and also an account of such as are sold; and he shall, previous to the Audit, certify the correctness of such account.

CHAPTER XI.

Of the Meetings of the Society.

I. THE Session of the Society shall commence on the third Thursday in November, and end on the third Thursday in June.

II. The ordinary Meetings of the Society shall be weekly, (excepting Christmas week, and the week following, and also Passion, Easter, and Whitsun-weeks, Ascension-day, and also the weeks during which the Anniversary Meeting and Annual Meeting for the election of Fellows are held,) on Thursdays, and shall begin at half-past Eight o'clock in the Evening, precisely.

III. No stranger, excepting Foreign Ambassadors and Ministers, and other distinguished persons specially invited by the President, shall, on any account, be permitted to be present during the Meeting, unless by order of the President, or by leave obtained of the Society upon the written recommendation of some Fellow before the President takes the Chair; and the name of every person so permitted to be present, and of the Fellow who recommended him, shall be entered in the Journal-book.

IV. The business of the Society in their ordinary Meetings shall be, to read and hear letters, reports, and other papers, concerning Philosophical matters[2].

V. At the ordinary Meetings of the Society, nothing relating to its Statutes or management shall be brought forward or discussed[3].

VI. The Anniversary Meeting for the election of the Council and Officers, and the Annual Meeting for the election of Fellows, shall take place at an hour to be determined by the Council.

CHAPTER XII.

Of Special General Meetings of the Society.

I. THE President or Council may at any time call a Special General Meeting of the Society when it may appear to them to be necessary.

II. Any six Fellows may, by notice in writing, signed by them, and delivered to one of the Secretaries at an ordinary Meeting of the Society, require a Special General Meeting of the Society to be convened, for the purpose of considering and determining on the matters specified in such requisition.

III. The Council shall, within one week after such requisition shall have been so delivered, appoint a day for a Special General Meeting accordingly, and give one week's notice thereof to each Fellow residing within the limits of the three-penny post, stating in the notice the object of such Meeting. At such Meeting no business shall be brought forward except what shall have been so notified.

CHAPTER XIII.

Of the Publication of Papers.

I. THE Members of the Council for the time being, shall constitute and be a standing Committee, to whom the consideration of the Publication of such Papers as shall have been read, or communicated to the Society at their weekly Meetings, shall from time to time be referred. This Committee shall meet at such times as shall be appointed by the President; due and sufficient notice of such Meeting having been previously sent to every Member of the Committee.

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[2] Discussions upon these subjects are now permitted.

[3] By a resolution of the Council made January 28th, 1836, this clause is intended to prevent the discussion of any subject not immediately connected with the usual business of the ordinary Meetings.

II. No less number than Seven of the Members of the said Committee (of which number the President, or in his absence a Vice-President, shall always be one,) shall be a *Quorum*, capable of acting in relation to the said Papers.

III. The majority of the said Committee, present at any Meeting thereof, shall be at liberty to call in to their assistance, at that or any other subsequent Meeting, any other Fellows of the Society, who are knowing and well-skilled in the particular branch of Science to which the Paper under deliberation relates; and the persons so called in to assist may give their votes on all Papers to be considered at the Meeting at which they shall be desired to assist, in the same manner as if they were Members of the Committee.

IV. At every Meeting of the Committee, their method of proceeding upon the Papers to be considered by them shall be thus: The entry in the Journal-book of the Society, relating to any paper, upon which the opinion of the Committee is to be taken, shall be read; or, if any Member shall desire it, the paper itself shall be read: after which the question shall be put, whether that paper shall be printed in the *Philosophical Transactions*, unless the opinion of the majority of the Committee shall be in favour of adjourning the consideration of it to a subsequent Meeting. The question shall always be decided by ballot, and by a majority of votes; but if there be an equality of votes, the further consideration of the question shall be adjourned to the next Meeting of the Committee, when that question shall be taken into consideration before any other business is entered upon: and if, at the second balloting upon the same question, there be still an equality of votes, it shall be determined in the negative. The decisions of the Committee respecting the printing of Papers in the *Philosophical Transactions* shall be entered in the Minute-book of the Committee.

V. The *Philosophical Transactions* shall be printed at the sole charge, and for the sole use and benefit, of the Society, and of the Fellows thereof; to the intent that each of the present Fellows, who actually contributes and pays towards the support of the Society, or who has compounded for such contribution, according to the rules and orders established in relation thereto, or who has for other particular reasons been exonerated and discharged from such contribution, by order of the Council, may receive *gratis* (but under proper limitations and restrictions) one copy of such of the *Philosophical*

Transactions as shall be printed as aforesaid: and that all persons who shall hereafter be admitted Fellows, shall, under the same conditions, receive, and be entitled to the like benefit and advantage.

VI. Once, at least, in every year, a proper portion of the Papers, which have been communicated to the Society, and ordered for publication by the Committee, shall be printed, under the name and title of *Philosophical Transactions of the Royal Society of London;* and the time and manner of printing those Papers shall be fixed and determined by the Council, as occasion shall require. A number of the copies so printed, sufficient to supply the Fellows of the Society, shall be delivered to the Assistant Secretary, who shall enter in a book, to be provided for that purpose, the number of copies received by him, for which he shall be accountable to the Council for the time being.

VII. The Assistant Secretary shall deliver *gratis*, at the Society's House, one of the said copies to every Fellow of the Society (except as hereinafter excepted) who shall demand the same, either in person, or by letter or other writing under the hand of such Fellow as shall not come in person to make such demand: and the person so receiving a copy of such *Philosophical Transactions* shall at the same time sign the above-mentioned book, as having received the said copy.

VIII. In order that the Fellows may be apprised of the time when it will be proper for them to come or send for their respective copies, due and timely notice shall be given in some one or more of the public newspapers of the day upon which the Assistant-Secretary will begin to deliver out the said copies, which day shall be fixed and appointed by the Council.

Provided always, that no Fellow whatsoever of the Society shall be entitled to demand or receive any such copy of the *Transactions*, whose annual contribution shall be one year in arrear, or whose Election and Payment of Admission fees and regular Contributions shall not have preceded the date of the time appointed for the delivery of the said *Transactions;* neither shall the Executor of any deceased Fellow receive a copy of the *Transactions* published after the death of such Fellow.

Provided also, that no Fellow of the Society shall receive, or be entitled to receive, *gratis*, any copy or copies of the *Transactions*, so printed as aforesaid, after one year shall have elapsed from the time of the Assistant-Secretary's having begun to deliver out such copies respectively; but his neglecting to demand them for so long a time shall be deemed a forfeiture and dereliction of his right thereto: unless the Council for the time being, upon being made acquainted with the reason of such delay, shall *order* the same to be so delivered; such *order*, however, shall not extend further back than to the last *five years* preceding its date.

IX. If the number of copies so to be printed shall be greater than what will be requisite to supply each of the Fellows with one copy, such supernumerary copies, as also all such as shall remain in the hands of the Assistant-Secretary after five years shall have elapsed from the time of his having begun to deliver out such copies respectively, shall be disposed of, at such times, and in such manner, as the Council shall direct.

CHAPTER XIV.

Of the Books and Papers of the Society.

I. THERE shall be had and kept a Book, called the *Charter-book*, wherein shall be fairly written the copy of the Charters, all the Royal Grants on the behalf of the Society, and the Obligation to be subscribed by the Fellows of the Society in their own handwriting.

II. There shall be kept a Book, called the *Statute-book*, wherein shall be fairly written all the Laws, Statutes, and Constitutions made, or to be made, concerning the government and regulating of the Society or Council; and also a Register of the Fellows of the Society, with the times of their Election and Admission.

III. There shall be kept *Journal-books* of the Society, and also of the Council, wherein shall be entered all the Minutes, Orders, and business of the Society and Council at their respective Meetings; to which Journal-books any Fellow may have access at such times as the Library is open.

IV. The original copy of every Paper read at the Society shall be considered the property of the Society, if there be no previous engagement with its Author to the contrary; but any Author may have a copy of his own Papers by leave of the Council.

V. All the Papers read at the Society in the course of each year, and not withdrawn by leave of the Council, shall be delivered to the Committee of Papers; and shall be preserved for future inspection; and shall never be lent out of the Society's House without Order of the Council.

VI. The Library shall be open to the Fellows every day, Sundays excepted, from Eleven in the morning till Four in the afternoon; excepting on Good Friday, and during Easter, Whitsun and Christmas weeks, when it shall be closed.

VII. Any Fellow may have the loan of any of the printed Books of the Society, excepting such as the Council shall order not to be taken out of the Library, by giving his note for the due return of them in the condition in which he received them; but he shall not be allowed to have in his possession more than four volumes at a time. The loan of Manuscripts is exclusively vested in the President and Council.

VIII. A List of all Books and Manuscripts borrowed from the Library of the Royal Society, and of the Fellows of the Society to whom they are lent, shall be kept in the Library.

IX. All Books whatsoever belonging to the Society shall be returned at a time to be specified by the Council, in each year; and the Library shall be closed for one month after such time, or for such shorter periods as the Council may direct.

X. The value of such Books in the possession of any Fellow as are not returned to the Library pursuant to the preceding Statute, shall be required to be paid by the person who has so detained them.

CHAPTER XV.

Of the Common Seal and Deeds.

I. THE Common Seal of the Society shall be kept in an iron chest, having three locks, with three different keys; whereof one shall be in the custody of the President, another of the Treasurer, and the third of the Senior Secretary.

II. Every Deed, or writing, to which the Common Seal is to be affixed, shall be passed and sealed in Council, and signed by the President on the fore part near the label, and signed on the back by the rest of the Members of the Council present.

CHAPTER XVI.

Of the making and repealing of Laws.

I. FOR the making of any Law or Statute of the Royal Society, the draught thereof shall be read in Council, and put to the vote, on two several days of their Meeting. The first day the question to be resolved by vote shall be to this effect, viz. "Whether the draught of the said Statute, then agreed upon, shall be read at another Meeting?" The second day the question shall be to this effect, viz. "Whether the draught of the said Statute, then agreed upon, shall pass for a Law, or not?"

II. For the repealing of any Law or Statute, or any part thereof, the Repeal shall be proposed and voted in Council on two several days of their Meeting. The first day the question to be resolved by Ballot shall be to this effect, viz. "Whether the Repeal of such a Statute, or such part thereof, shall be proposed at another Meeting?" The second day the question shall be to this effect, viz. "Whether such a Statute, or such part thereof, shall be repealed, or not?" And in case the said Repeal be agreed unto, the same shall be recorded in the Journal-book of the Council; and the Statute, or part of the Statute, repealed, shall be cancelled in the Statute-book.

VII.

PRESIDENTS OF THE ROYAL SOCIETY.

	Date of Election.	Years in Office.
Sir Robert Moray, (before the Incorporation)	March 6, 1660–1	2
William, Lord Viscount Brouncker	April 22, 1663	14
Sir Joseph Williamson, Kt.	Nov. 30, 1677	3
Sir Christopher Wren, Kt.	Nov. 30, 1680	2
Sir John Hoskyns, Bart.	Nov. 30, 1682	1
Sir Cyril Wyche, Kt.	Nov. 30, 1683	1
Samuel Pepys, Esq.	Dec. 1, 1684	2
John, Earl of Carbery	Nov. 30, 1686	3
Thomas, Earl of Pembroke	Nov. 30, 1689	1
Sir Robert Southwell, Kt.	Dec. 1, 1690	5
Charles Montague, Esq., (afterwards Earl of Halifax)	Nov. 30, 1695	3
John, Lord Somers	Nov. 30, 1698	5
Sir Isaac Newton, Kt.	Nov. 30, 1703	24
Sir Hans Sloane, Bart.	Nov. 30, 1727	14
Martin Folkes, Esq.	Nov. 30, 1741	11
George, Earl of Macclesfield	Nov. 30, 1752	12
James, Earl of Morton	Nov. 30, 1764	4
James Burrow, Esq.	Oct. 27, 1768	—
James West, Esq.	Nov. 30, 1768	4
James Burrow, Esq.	July — 1772	—
Sir John Pringle, Bart.	Nov. 30, 1772	6
Sir Joseph Banks, Bart.	Nov. 30, 1778	41
William Hyde Wollaston, M. D.	June 29, 1820	—
Sir Humphry Davy, Bart.	Nov. 30, 1820	7
Davies Gilbert, Esq.	Nov. 6, 1827	3
H.R.H. The Duke of Sussex	Nov. 30, 1830	8
The Marquis of Northampton, who still continues	Nov. 30, 1838	—

VIII.

TREASURERS OF THE ROYAL SOCIETY.

Date of Election.	
April 22, 1663.	William Ball.
Nov. 30, 1663.	Abraham Hill.
Nov. 30, 1665.	Daniel Colwal.
Dec. 1, 1679.	Abraham Hill.
Nov. 30, 1700.	Alexander Pitfield.
Nov. 30, 1728.	Roger Gale.
Nov. 30, 1736.	James West.
Nov. 30, 1768.	Samuel Wegg.
Nov. 30, 1802.	William Marsden.
Nov. 30, 1810.	Samuel Lysons.
July 29, 1819.	Davies Gilbert.
Nov. 30, 1827.	Henry Kater.
Nov. 30, 1830.	John William Lubbock.
Nov. 30, 1835.	Francis Baily.
Nov. 30, 1838.	John William Lubbock.
Nov. 30, 1845.	George Rennie, (still continues).

IX.

SECRETARIES OF THE ROYAL SOCIETY.

Date of Election.		Vacated Office.
April 22, 1663.	John Wilkins, D.D. - -	Nov. 30, 1668.
April 22, 1663.	Henry Oldenburg - -	Sept. 1677.
Nov. 30, 1668.	Thomas Henshaw - - -	Nov. 30, 1672.
Nov. 30, 1672.	John Evelyn - - -	Nov. 30, 1673.
Nov. 30, 1673.	Abraham Hill - - -	Nov. 30, 1675.
Nov. 30, 1675.	Thomas Henshaw - -	Nov. 30, 1677.
Nov. 30. 1677.	Nehemiah Grew, M.D. - -	Nov. 30, 1679.
Nov. 30, 1677.	Robert Hooke - - -	Nov. 30, 1682.
Nov. 30, 1679.	Thomas Gale, D.D. - -	Nov. 30, 1681.
Nov. 30, 1681.	Francis Aston - - -	Dec. 9, 1685.

Date of Election.		Vacated Office.
Nov. 30, 1682.	Robert Plot, LL.D. - - -	Nov. 30, 1684.
Nov. 30, 1684.	William Musgrave - -	Nov. 30, 1685.
Nov. 30, 1685.	Tancred Robinson, M.D. -	Dec. 9, 1685.
Dec. 16. 1685.	Sir John Hoskyns, Bart. -	Nov. 30, 1687.
Dec. 16, 1685.	Thomas Gale, D.D. - -	Nov. 30, 1693.
Nov. 30, 1687.	Richard Waller - - -	Nov. 30, 1709.
Nov. 30, 1693.	Hans Sloane, M.D. - -	Nov. 30, 1713.
Nov. 30, 1709.	John Harris, D.D. - -	Nov. 30, 1710.
Nov. 30, 1710.	Richard Waller - - -	Nov. 30, 1714.
Nov. 30, 1713.	Edmund Halley, LL.D -	Nov. 30, 1721.
Jan. 13, 1714.	Brook Taylor, LL.D. - -	Nov. 30, 1718.
Dec. 1, 1718.	John Machin - - -	Nov. 30, 1747.
Nov. 30, 1721.	James Jurin, M.D. - - -	Nov. 30, 1727.
Nov. 30, 1727.	William Rutty, M.D. - -	Nov. 30, 1730.
Nov. 30, 1730.	Cromwell Mortimer, M.D. -	Nov. 30, 1752.
Nov. 30, 1747.	Peter Daval - - -	Nov. 30, 1759.
Nov. 30, 1752.	Thomas Birch, D.D. - -	Nov. 30, 1765.
Nov. 30, 1759.	Charles Morton, M.D - -	Nov. 30, 1773.
Nov. 30, 1765.	Matthew Maty, M.D. - -	Nov. 30, 1776.
Nov. 30, 1773.	Samuel Horsley, LL.B. -	Nov. 30, 1778.
Nov. 30, 1776.	Joseph Planta - - -	Nov. 30, 1804.
Nov. 30, 1778.	Paul Henry Maty, M.A. -	Mar. 25, 1784.
May 5, 1784.	Charles Blagden, M.D. - -	Nov. 30, 1797.
Nov. 30, 1797.	Edward Whitaker Gray, M.D.	Nov. 30, 1807.
Nov. 30, 1804.	William Hyde Wollaston, M.D.	Nov. 30, 1816.
Jan. 22, 1807.	Sir Humphry Davy, Bart. -	Nov. 30, 1812.
Nov. 30, 1812.	Taylor Combe - - -	Nov. 30, 1824.
Nov. 30, 1816.	William Thomas Brande -	Nov. 30, 1826.
Nov. 30, 1824.	Sir John Frederick William Herschel, Bart., M.A. - -	Nov. 30, 1827.
Nov. 30, 1826.	John George Children - -	Nov. 30, 1827.
Nov. 30, 1827.	Peter Mark Roget, M.D. - -	Still continues.
Nov. 30, 1827.	Lieut.-Col. Edward Sabine, R.A.	Nov. 30, 1830.
Nov. 30, 1830.	John George Children - -	Nov. 30, 1837.
Nov. 30, 1837.	Samuel Hunter Christie, M.A.	Still continues.

X.

FOREIGN SECRETARIES OF THE ROYAL SOCIETY.

Date of Election.	
April 11, 1723.	Philip Henry Zollman.
April 18, 1728.	Dr. Dillenius and Dr. Schuchzer.
Aug. 29, 1748.	Thomas Stack, M. D.
Nov. 20, 1751.	James Parsons, M. D.
Mar. 4, 1762.	Matthew Maty, M. D.
Dec. 11, 1766.	John Bevis, M. D.
Feb. 13, 1772.	Paul Henry Maty.
June 30, 1774.	Joseph Planta.
Jan. 14, 1779.	Charles Hutton.
June 17, 1784.	Charles Peter Layard.
Mar. 22, 1804.	Thomas Young, M. D.
Nov. 30, 1830.	Charles König.
Nov. 30, 1837.	Capt. William Henry Smyth, R. N.
Nov. 30, 1839.	John Frederic Daniell.
Dec. 1, 1845.	Lieut.-Col. E. Sabine, R.A. (still continues).

XI.

CLERKS AND ASSISTANT-SECRETARIES OF THE ROYAL SOCIETY.

Date of Election.	
May 13, 1663.	John Weeks.
Jan. 27, 1685-6.	Edmund Halley.
1698.	Jezreel Jones.
Dec. 7, 1713.	Alban Thomas.
May 9, 1723.	Francis Hawksbee.
Feb. 3, 1763.	Emanuel Mendez da Costa.
Jan. 7, 1768.	John Robertson.
Jan. 9, 1777.	John Robertson, (son of the above).
Mar. 3, 1785.	George Gilpin.
Nov. 30, 1810.	Stephen Lee (first Assistant-Secretary).
April 6, 1826.	James Hudson.
April 2, 1835.	John David Roberton.
Dec. 14, 1843.	Charles Richard Weld.
	Clerk.
May 2, 1844.	Walter White.

XII.

TABLE *showing the Numbers and Volumes of the* PHILOSOPHICAL TRANSACTIONS, *with their respective Editors.*

Year.	Number.	Volume.	Editor.
1665	1— 7	1	Henry Oldenburg.
6	8— 20		
7	21— 22		
8	23— 32	2	—
9	33— 44	3	—
1670	45— 56	4	—
1	57— 68	5	—
2	69— 80	6	—
	81— 91	7	—
3	92—100	8	—
4	101—109	9	—
5	110—120	10	—
6	121—132	11	—
7	133—137	12	Do. and Dr. Grew.
8	138—142		Dr. Grew.
Phil. Collec.			
1679	1		
1681	2— 3		Dr. Hooke.
2	4— 7		—
1683	143—154	13	Dr. Plot.
4	155—166	14	—
5	167—178	15	William Musgrave.
6	179—185	16	Dr. Halley.
7	186—191		
1691	192—194	17	Richard Waller.
2	195		
3	196—206		
4	207—214	18	—
5	215—218	19	Sir Hans Sloane.
6	219—223		
7	224—235		
8	236—247	20	—
9	248—259	21	—

Year.	Number.	Volume.	Editor.
1700	260—267	22	Sir Hans Sloane.
1	268—276		
2	277—282	23	—
3	283—288		
4	289—294	24	—
5	295—304		
6	305—308	25	—
7	309—312		
8	313—318	26	—
9	319—324		
1710	325—328	27	—
1	329—332		
2	333—336		
3	337	28	—
4	338—342	29	Dr. Halley.
5	343—346		
6	347—350		
7	351—354	30	—
8	355—358		
9	359—363		
1720	364—366	31	Dr. Jurin.
1	367—369		
2	370—374	32	—
3	375—380		
4	381—385	33	—
5	386—391		
6	392—396	34	—
7	397—398		
8	399—406	35	Dr. Rutty.
9	407—411	36	Dr. Mortimer.
1730	412—416		
1731	417—421	37	—
2	422—426		
3	427—430	38	—
4	431—435		
5	436—439	39	—
6	440—444		
7	445—446	40	—
8	447—451		

Year.	Number.	Volume.	Editor.
1739	452—455	41	Dr. Mortimer.
1740	456—459		
1	460—461		
2	462—467	42	—
3	468—471		
4	472—474	43	—
5	475—477		
6	478—481	44	—
7	482—484		
8	485—490	45	—
9	491—493	46	—
1750[1]	494—497		

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[1] From this period *The Transactions*, as stated in the body of the work, were published under the superintendence of a Committee of the Society. For the first twelve years, only one half Volume was issued annually, but from 1762 a complete volume, consisting of two or more parts, has been published in each year. The number of Volumes to 1847 inclusive is 137.

XIII.

CLASSIFICATION *of the* PAPERS *contained in the* PHILOSOPHICAL TRANSACTIONS *from* 1665, *to* 1848.

Mathematics	285
Astronomy	621
Mechanics, Hydrostatics, Hydraulics, and Acoustics	461
Optics	206
Chemistry, Pneumatics, and Meteorology	929
Electricity, Galvanism, and Magnetism	416
Geology and Mineralogy	384
Botany and Agriculture	280
Zoology	420
Anatomy, Physiology, and Medicine	1020
Geography and Topography	77
Archaeology	117
Miscellaneous	120
Total	5336

XIV.

AWARDS OF THE COPLEY MEDAL.

Date of Award.	To whom Awarded.	Subject of Award.
1731 1732	Stephen Gray	For his New Electrical Experiments.
1733	*Not awarded.*	
1734	J. T. Desaguliers	— Experiments in Mechanical Philosophy.
1735	*Not awarded.*	
1736	J. T. Desaguliers	— Experiments in Mechanical Philosophy.
1737	John Belchier	— Experiment of Dyeing the Bones of Living Animals Red with Madder Root.
1738	James Valoue	— Invention of an Engine for driving Piles for the Bridge to be erected at Westminster.
1739	Stephen Hales	— Experiments towards the Discovery of Medicines for Dissolving the Stone, and Preservatives for Keeping Meat at Sea.
1740	Alexander Stuart	— Lectures on Muscular Motion.
1741	J. T. Desaguliers	— Experiments in Electricity.
1742	Christopher Middleton	— Communication of Observations in the Attempt of Discovering a N.W. Passage to the East Indies through Hudson's Bay.
1743	Abraham Trembley	— Experiments on the Polypus.
1744	Henry Baker	— Curious Experiments relating to the Crystallization or Configuration of the minute particles of Saline Bodies dissolved in a Menstruum.
1745	William Watson	— Surprising Discoveries in Electricity, exhibited in his late Experiments.
1746	Benjamin Robins	— Curious Experiments showing the Resistance of the Air.
1747	Gowin Knight	— Curious Experiments with Natural and Artificial Magnets.

Date of Award.	To whom Awarded.	Subject of Award.
1748	James Bradley	For his Curious and Wonderful Discoveries in the apparent Motion of the Fixed Stars.
1749	John Harrison	— Curious Instruments invented and made by him for the exact Mensuration of Time.
1750	George Edwards	— Curious Book entitled A Natural History of Birds.
1751	John Canton	— Curious Method of Making Artificial Magnets without the use of Natural ones.
1752	John Pringle	— Curious and Useful Experiments on Septic and Anti-Septic Substances.
1753	Benjamin Franklin	— Curious Experiments and Observations on Electricity.
1754	William Lewis	— Experiments on Platinum, which tend to the Discovery of the Sophistication of Gold: which want of materials prevented him from completing.
1755	John Huxham	— Many Useful Experiments on Antimony.
1756	*Not awarded.*	
1757	Lord Ch. Cavendish	— Very Curious and Useful Invention of making Thermometers.
1758	John Dollond	— Curious Experiments and Discoveries concerning the different Refrangibility of the Rays of Light.
1759	John Smeaton	— Curious Experiments concerning Water-wheels and Windmill-Sails.
1760	Benjamin Wilson	— Many Curious Experiments in Electricity.
1761	*Not awarded.*	
1762	—	
1763	—	
1764	—	
1765	John Canton	— Very Ingenious and Elegant Experiments in the Air-Pump and Condensing-Engine, to prove the Compressibility of Water.
1766	William Brownrigg	— Experimental Inquiry into the Mineral Elastic Spirit or Air contained in Spa Water.
1766	Edward Delaval	— Experiments on the Specific Gravities of the Several Metals.

Date of Award.	To whom Awarded.	Subject of Award.
1766	Henry Cavendish	For his Experiments relating to Fixed Air.
1767	John Ellis	— Papers on the Animal Nature of the Genus of Zoophytes called *Corallina.*
1768	Peter Woulfe	— Experiments on the Distillation of Acids, Volatile Alkalies, and other Substances.
1769	William Hewson	— Papers on the Lymphatic System in Amphibious Animals and in Fish.
1770	William Hamilton	— Paper entitled An Account of a Journey to Mount Etna.
1771	*Not awarded.*	
1772	Matthew Raper	— Paper entitled An Enquiry into the Value of Ancient Greek and Roman Money.
1773	Joseph Priestley	— Many Curious and Useful Experiments on Different Kinds of Air.
1774	John Walsh	— Paper on the Torpedo.
1775	Nevil Maskelyne	— Curious and Laborious Observations on the Attraction of Mountains.
1776	James Cook	— Paper containing the Method he had taken for Preserving the Health of the Crew of H.M.S. *The Resolution.*
1777	John Mudge	— Paper on the best Composition for the Metals of Reflecting Telescopes, and for Grinding and Polishing the Speculum.
1778	Charles Hutton	— Paper entitled The Force of Fine Gunpowder, and the Initial Velocity of Cannon Balls.
1779	*Not awarded.*	
1780	Samuel Vince	— Paper entitled An Investigation of the Principles of Progressive and Rotatory Motion.
1781	William Herschel	— Discovery of a New and Singular Star.
1782	Richard Kirwan	— Labours in the Science of Chemistry.
1783	John Goodricke	— Discovery of the Period of the Variation of Light in the Star *Algol.*

Date of Award.	To whom Awarded.	Subject of Award.
1783	Thomas Hutchins	For his Experiments to ascertain the Point of Mercurial Congelation.
1784	Edward Waring	— Mathematical Communications to the Society.
1785	William Roy	— Measurement of a Base on Hounslow Heath.
1786	*Not awarded.*	
1787	John Hunter	— Papers On the Ovaria, On the Identity of the Dog, Wolf, and Jackal Species, and On the Anatomy of Whales.
1788	Charles Blagden	— Papers on Congelation.
1789	William Morgan	— Papers on the Values of Reversions and Survivorships.
1790	*Not awarded.*	
1791	James Rennell	— Paper on the Rate of Travelling, as performed by Camels.
1791	Andrew De Luc	— Improvements in Hygrometry.
1792	Benjamin Rumford	— Various Papers on the Properties and Communication of Heat.
1793	*Not awarded.*	
1794	Professor Volta	— Several Communications Explanatory of certain Experiments published by Professor Galvani.
1795	Jesse Ramsden	— Various Inventions and Improvements in Philosophical Instruments.
1796	George Attwood	— Paper on the Construction and Analysis of Geometrical Propositions determining the Positions assumed by Homogeneal Bodies which float freely, and at rest.
1797	*Not awarded.*	
1798	G. S. Evelyn	— Various Communications printed in the *Philosophical Transactions.*
1798	Charles Hatchett	— Chemical Communication printed in the *Philosophical Transactions.*
1799	John Hellins	— Improved Solution of a Problem in Physical Astronomy.
1800	Edward Howard	— Paper on a New Fulminating Mercury.
1801	Astley Paston Cooper	— Papers on the Effects which take place on the Destruction of the Membrana Tympani of the Ear.
1802	W. H. Wollaston	— Various Papers printed in the *Philosophical Transactions.*

Date of Award.	To whom Awarded.	Subject of Award.
1803	Richard Chenevix	For his Various Chemical Papers printed in the *Philosophical Transactions.*
1804	Smithson Tennant	— Various Chemical Discoveries communicated to the Society.
1805	Humphry Davy	— Various Communications published in the *Philosophical Transactions.*
1806	T. A. Knight	— Various Papers on Vegetation, printed in the *Philosophical Transactions.*
1807	Everard Home	— Various Papers on Anatomy and Physiology, printed in the *Philosophical Transactions.*
1808	William Henry	— Various Papers communicated to the Society, printed in the *Philosophical Transactions.*
1809	Edward Troughton	— Account of his Method of Dividing Astronomical Instruments, printed in the *Philosophical Transactions.*
1810	*Not awarded.*	
1811	B. C. Brodie	— Various Papers printed in the *Philosophical Transactions.*
1812	*Not awarded.*	
1813	W. T. Brande	— Communications concerning the Alcohol contained in Fermented Liquors, and other Papers published in the *Philosophical Transactions.*
1814	James Ivory	— Various Mathematical Communications, printed in the *Philosophical Transactions.*
1815	David Brewster	— Paper on the Polarization of Light by Reflection.
1816	*Not awarded.*	
1817	Henry Kater	— Experiments on the Pendulum.
1818	Henry Seppings	— Papers on the Construction of Ships of War.
1819	*Not awarded.*	
1820	J. C. Oersted	— Electro-Magnetic Discoveries.
1821	Edward Sabine	— Various Communications relating to his Researches made in the late Expedition to the Arctic Regions.
1821	J. F. W. Herschel	— Papers printed in the *Philosophical Transactions*

Date of Award.	To whom Awarded.	Subject of Award.
1822	William Buckland	For his Papers on the Fossil Teeth and Bones discovered in a Cave at Kirkdale.
1823	John Pond	— Various Papers on Subjects of Astronomy.
1824	John Brinkley	— Various Communications to the Royal Society.
1825	François Arago	— Discovery of the Magnetic Properties of Substances not containing Iron.
1825	Peter Barlow	— Various Communications on the Subjects of Magnetism.
1826	James South	— Observations of Double Stars, and his Paper on the Discordances between the Sun's observed and computed Right Ascensions.
1827	William Prout	— Paper on the ultimate Composition of simple Alimentary Substances.
1827	Henry Foster	— Magnetic and other Observations made during the Arctic Expedition.
1828	*Not awarded.*	
1829	—	
1830	—	
1831	G. B. Airy	— Papers on Optical Subjects.
1832	Michael Faraday	— Discovery of Magneto-electricity, published in the *Philosophical Transactions.*
1832	Simeon Denis Poisson	— Work entitled *Nouvelle Théorie de l'Action Capillaire.*
1833	*Not awarded.*	
1834	Giovanni Plana	— Work entitled *Théorie du Mouvement de la Lune.*
1835	W. S. Harris	— Experimental Investigations of the Forces of Electricity of High Intensity.
1836	Jens Jacob Berzelius	— Systematic Application of the Doctrine of Definite Proportions to the Analysis of Mineral Bodies.
1836	Francis Kiernan	— Discoveries relating to the Structure of the Liver.
1837	Antoine C. Becquerel	— Various Memoirs on the Subject of Electricity, published in the *Mémoires de l'Académie Royale des Sciences de l'Institut.*

Date of Award.	To whom Awarded.	Subject of Award.
1837	John Frederick Daniell	For his Two Papers on Voltaic Combinations, published in the *Philosophical Transactions.*
1838	Michael Faraday	— Researches in Specific Electrical Induction.
1838	Karl F. Gauss	— Inventions and Mathematical Researches in Magnetism.
1839	Robert Brown	— Discoveries during a Series of Years on the Subject of Vegetable Impregnation.
1840	Justus Liebig	— Discoveries in Organic Chemistry.
1841	J. C. F. Sturm	— *Mémoire sur la Resolution des Equations Numériques.*
1841	G. S. Ohm	— Researches into the Laws of Electric Currents.
1842	James Mac Cullagh	— Researches connected with the Wave Theory of Light.
1843	Jean Baptiste Dumas	— Valuable Researches in Organic Chemistry.
1844	C. Matteucci	— Various Researches in Animal Electricity.
1845	Professor Schwann	— Physiological Researches on the Development of Animal Textures.
1846	U. J. Le Verrier	— Investigation relative to the Disturbances of Uranus, by which he proved the existence and predicted the Place of the New Planet *(Neptune).*
1847	J. F. W. Herschel	— Work entitled *Results of Astronomical Observations, made during the Years* 1834, 5, 6, 7, *and* 8, *at the Cape of Good Hope,* being the completion of a Telescopic Survey of the Whole Surface of the Visible Heavens.

XV.

AWARDS OF THE ROYAL MEDAL.

Date of Award.	To whom Awarded.	Subject of Award.
1826	John Dalton	For his Development of the Atomic Theory.
—	James Ivory	— Paper on Astronomical Refractions (*Phil. Trans.* 1823.)
1827	Humphry Davy	— Bakerian Lecture on the Relations of Electrical Charges.
—	F. G. W. Struve	— Work entitled *Catalogus Novus Stellarum Duplicium.*
1828	J. F. Encke	— Accurate Determination of the Orbit of a Comet of Short Period, as confirmed by Observation.
—	W. H. Wollaston	— Communication on a Method of rendering Platina Malleable.
1829	Charles Bell	— Discoveries relating to the Nervous System (*Phil. Trans.* 1830.)
—	Eilert Mitscherlich	— Discoveries relating to the Laws of Crystallization, and the Properties of Crystals.
1830	David Brewster	— Communications on the Polarization and other Properties of Light (*Phil. Trans.* 1831.)
—	M. Balard	— Discovery of Brome (*Phil. Trans.* 1831.)
1833	A. P. De Candolle	— Researches and Investigations in Vegetable Physiology (*Phil. Trans.* 1833.)
—	J. F. W. Herschel	— Paper on the Investigation of the Orbits of Revolving Double Stars.
1834	J. W. Lubbock	— Papers on the Tides.
—	Charles Lyell	— Work entitled Principles of Geology.
1835	Michael Faraday	— Experimental Researches in Electricity.
—	W. R. Hamilton	— Paper entitled Supplement to an Essay on the Theory of Systems of Rays.
1836	George Newport	— Series of Investigations on the Anatomy and Physiology of Insects.

Date of Award.	To whom Awarded.	Subject of Award.
1836	J. F. W. Herschel	For his Paper on Nebulæ and Clusters of Stars (*Phil. Trans.* 1833.)
1837	William Whewell	— Researches connected with the Theory of the Tides.
—	*Second Medal not awarded.*	
1838	Thomas Graham	— Paper entitled Inquiries respecting the Constitution of Salts, of Oxalates, Nitrates, Phosphates, Sulphates, and Chlorides (*Phil. Trans.* 1836.)
—	Henry Fox Talbot	— Researches in the Integral Calculus (*Phil. Trans.* 1836-7.)
1839	James Ivory	— Paper entitled Theory of Astronomical Refractions (*Phil. Trans.* 1838.)
—	Martin Barry	— Papers on Embryology (*Phil. Trans.* 1838-9.)
1840	J. F. W. Herschel	— Paper on the Chemical Action of the Rays of the Solar Spectrum on the Preparation of Silver and other Substances, both Metallic and non-Metallic, and on some Photogenic Processes (*Phil. Trans.* 1840.)
—	Charles Wheatstone	— Paper entitled 'Contributions to the Physiology of Vision' (*Phil. Trans.* 1838.)
1841	Robert Kane	— Memoir entitled 'The Chemical History of Archil and Litmus' (*Phil. Trans.* 1840.)
—	Eaton Hodgkinson	— Paper entitled 'Experimental Researches on the Strength of Pillars of Cast Iron' (*Phil. Trans.* 1840.)
1842	William Bowman	— Paper on the Structure and Use of the Malpighian Bodies of the Kidneys (*Phil. Trans.* 1842.)
—	J. F. Daniell	— Letters on the Electrolysis of Secondary Compounds, and on Voltaic Combinations (*Phil. Trans.* 1840-1842.)
1843	James David Forbes	— Researches on the Law of Extinction of the Solar Rays in passing through the Atmosphere (*Phil. Trans.* 1842.)

Date of Award.	To whom Awarded.	Subject of Award.
1843	Charles Wheatstone	For his Account of several New Instruments and Processes for Determining the Constants of a Voltaic Circuit (*Phil. Trans.* 1843.)
1844	George Boole	— Paper entitled 'A General Method in Analysis' (*Phil. Trans.* 1844.)
—	Thomas Andrews	— Paper on the Thermal Changes accompanying Basic Substitutions (*Phil. Trans.* 1844.)
1845	George Biddell Airy	— Paper on the Laws of the Tides on the Coasts of Ireland (*Phil. Trans.* 1845.)
—	Thomas Snow Beck	— Paper on the Nerves of the Uterus (*Phil. Trans.* 1845.)
1846	Michael Faraday	— Experimental Researches in Electricity, 20th and 21st Series. 'On New Magnetic Actions and on the Magnetic Condition of all Matter' (*Phil. Trans.* 1846.)
—	Richard Owen	— Paper on a Description of certain Belemnites (*Phil. Trans.* 1844.)
1847	George Fownes	— Papers on the Artificial Formation of a Vegeto-Alkali and on Benzoline (*Phil. Trans.* 1845.)
—	William Robert Grove	— Papers on the Gas Voltaic Battery and on certain Phenomena of Voltaic Ignition (*Phil. Trans.* 1845-1847.)

XVI.

AWARDS OF THE RUMFORD MEDAL.

Date of Award.	To whom Awarded.	Subject of Award.
1800	Benjamin Rumford	For his Various Discoveries respecting Light and Heat (*Phil. Trans.* 1803.)
1804	John Leslie - -	— Experiments on Heat.
1806	William Murdoch -	— Publication of the Employment of Gas from Coal, for the purpose of Illumination (*Phil. Trans.* 1809.)
1810	Etienne-Louis Malus	— Discovery of Certain Properties of Reflected Light.
1814	William Charles Wells	— Essay on Dew.
1816	Humphry Davy -	— Papers on Combustion and Flame (*Phil. Trans.* 1817-1818.)
1818	David Brewster - -	— Discoveries relating to the Polarization of Light (*Phil. Trans.* 1819.)
1824	Augustin-Jean Fresnel	— Development of the Undulatory Theory, as applied to the Phenomena of Polarized Light; and for his various Important Discoveries in Physical Optics.
1834	Macédoine Melloni -	— Discoveries relative to Radiant Heat.
1838	James David Forbes -	— Experiments on the Polarization of Heat
1840	Jean Baptiste Biot -	— Researches in, and connected with, the Circular Polarization of Light.
1842	Henry Fox Talbot -	— Discoveries and Improvements in Photography.
1846	Michael Faraday -	— Discovery of the Optical Phenomena developed by the Action of Magnets and Electric Currents in certain Transparent Media (*Phil. Trans.* 1846.)

XVII.

Certificate of a Candidate for Election.

(N.B. Directions for filling up Certificates are given on the other side.)

(Name) ______________________________

(Title or Designation) ______________________

(Profession or Trade*) _____________________

(Usual place of Residence) __________________

Qualifications as being
- The Discoverer of ______________________
- The Author of _________________________
- The Inventor or Improver of ______________
- Distinguished for his acquaintance with the science of ___
- Eminent as a __________________________

---

being desirous of admission into the ROYAL SOCIETY OF LONDON, *we, the undersigned propose and recommend him as deserving that honour, and as likely to become a useful and valuable Member. Dated this day of* 18

FROM GENERAL KNOWLEDGE.	FROM PERSONAL KNOWLEDGE.

Read to the Society on the day of

To be balloted for on the day of

---

* If of no Profession or Trade, this should be stated by filling up the Blank with the word *None.*

DIRECTIONS *for filling up the* CERTIFICATE *of a* CANDIDATE.

BY the Statutes of the Royal Society every Candidate must be proposed and recommended by a Certificate in writing signed by *six* or more Fellows; (of whom *three* at least must certify their recommendation from personal knowledge:) which Certificate must specify the name, rank, profession, qualification, and usual place of residence of the Candidate: and it is recommended by the Council that the Members so proposing a Candidate for election, should also state in the Certificate his claim for admission under one or more of the following heads, applicable to the case; and that if a Candidate pursues any profession or trade, this should be specified in the Certificate.

As one who has made discoveries in some branch of science, which should be specified.

As the author of a work or paper of merit connected with science; the title of which should be stated.

As one who has invented or materially improved any astronomical, mathematical, or philosophical instrument, or chemical process, which should be specified.

As one distinguished for his acquaintance with some branch of science, which should be specified (*).

As a person eminently distinguished in one of the learned professions.

As a distinguished Engineer, Architect, Painter, Sculptor, or Engraver.

As one distinguished for his literary or archæological attainments.

As one who is attached to science, and anxious to promote its progress.

(*) This *single* testimonial will not be considered sufficient for any Candidate with reference to his professional attainments.

XVIII.

PORTRAITS AND BUSTS IN THE POSSESSION OF THE ROYAL SOCIETY.

PORTRAITS.

Subjects.	*Painters.*
Thomas Howard, Earl of Arundel	Murray.
Francis Aston, Sec. R.S.	Kerseboom?
Lord Chancellor Bacon	Van Somers.
Sir Joseph Banks, Bart., P.R.S.	T. Phillips, R.A.
Bavaria, Charles Theodore, King of.	
Thomas Birch, D.D., Sec. R.S.	J. Wills.
Hon. Robert Boyle	F. Kerseboom.
James Bradley, D.D., A.R.	Richardson.
Viscount Brouncker, P.R.S.	Sir P. Lely.
George Buchanan	Francis Pourbus, sen.
Paul Buissière	Gainsborough ?
Jeremias Burroughs.	
Sir James Burrow, P.R.S.	Vanloo ?
Des Cartes	Frank Hals.
Samuel Chandler, D.D.	M. Chamberlain.
Daniel Colwall, Treas. R.S.	
Copernicus	Lorman (*copy*).
Sir Humphry Davy, Bart. P.R.S.	Sir T. Lawrence, P.R.A.
William Derham, D.D.	G. White.
John Dollond	F. Witherington, R.A.
John Evelyn, Sec. R.S.	Kerseboom ?
Rev. John Flamsteed, A.R.	T. Gibson ?
Rev. John Flamsteed, A.R.	T. Gibson.
Martin Folkes, P.R.S.	W. Hogarth.
Fontenelle	H. Rigaud.
Benjamin Franklin, LL.D.	
Thomas Gale, D.D. Sec. R.S.	Riley ?
Gassendi	(*Venetian*)
Davies Gilbert, D.C.L., P.R.S.	T. Phillips, R.A.

Subjects.	*Painters.*
Edw. Whittaker Gray, M.D., Sec. R.S.	A. W. Callcott, R.A.
Theodore Haak	Richardson.
Edmund Halley, LL.D., Sec. R.S.	T. Murray.
Edmund Halley, LL.D., Sec. R.S.	Dahl.
William Harvey, M.D.	De Reyn.
Thomas Hobbes	Dobson.
Thomas Hobbes	Dobson (*after*).
Sir Everard Home, Bart., V.P.R.S.	T. Phillips, R.A.
John Huxham, M.D.	T. Rennel.
John Locke	Sir G. Kneller (*copy*).
Earl of Macclesfield, P.R.S.	T. Hudson.
Malpighi	A. M. Tobar.
Nevil Maskelyne, D.D., A.R.	Vanderburgh.
Abraham de Moivre	Highmore.
Henry More, D.D.	Sir Peter Lely.
Sir Isaac Newton, P.R.S.	D. L. Marchand.
Sir Isaac Newton, P.R.S.	C. Jervas.
Sir Isaac Newton, P.R.S.	Vanderbank.
Marquis of Northampton, P.R.S.	T. Phillips, R.A.
Henry Oldenburg, Sec. R.S.	David Beck.
Thomas Pagett, D.D.	Mary Beale ?
Samuel Pepys, P.R.S.	Sir G. Kneller.
Sir John Pringle, Bart, P.R.S.	Sir J. Reynolds, P.R.A.
H. C. Schumacher	M. Wulff.
Sir Hans Sloane, Bart., P.R.S.	Sir G. Kneller.
John Smeaton	Richardson.
John Smeaton	Mather Brown.
Lord Chancellor Somers, P.R.S.	Sir G. Kneller.
Sir Robert Southwell, P.R.S.	Sir G. Kneller.
Sir Henry Spelman	D. Mytens.
John Christopher Sturm	Dullaert.
Brook Taylor, LL.D., Sec. R.S.	Amiconi.
Richard Waller, Sec. R.S.	T. Murray.
John Wallis, D.D.	Zoust.
Sir William Watson, M.D.	Abbott.
Bishop Wilkins, Sec. R.S.	Mary Beale.
Sir Joseph Williamson, P.R.S.	Sir G. Kneller.
W. H. Wollaston, M.D., P.R.S.	J. Jackson, R.A.
Sir Christopher Wren, D.D., P.R.S.	
Sir Christopher Wren, P.R.S.	Sir G. Kneller.
Thomas Young, M.D.	H. P. Briggs, R.A.

BUSTS.

Subjects.	*Sculptors.*
Charles II.	Nollekens.
George III.	Ditto.
Sir Joseph Banks, P.R.S.	Chantrey.
Cuvier (*Bronze*)	
John Dollond	H. Garland.
Davies Gilbert, P.R.S.	Westmacott.
Sir Isaac Newton, P.R.S.	Roubilliac.
Laplace.	
Mrs. Somerville[1]	Chantrey.
James Watt	Ditto (*copy*).

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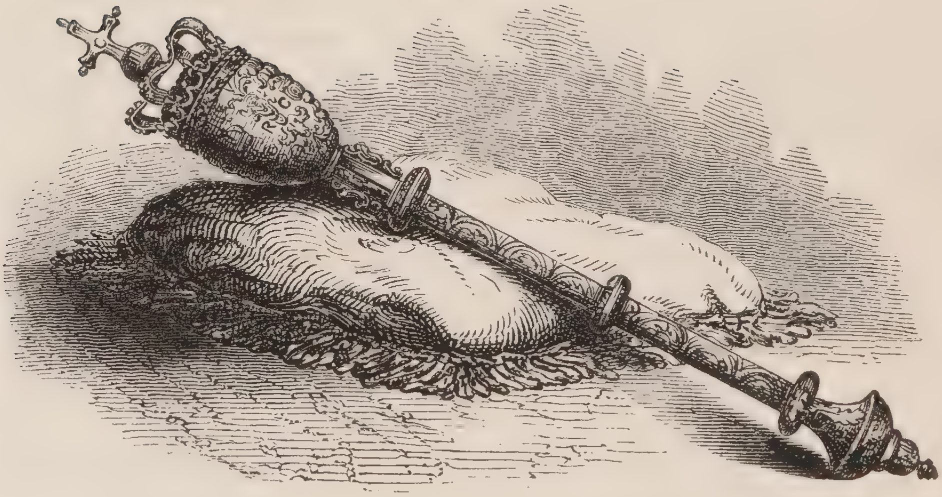
[1] This Bust was subscribed for by several Fellows of the Royal Society, and was presented to the Society by the late Duke of Sussex in his name, and that of the other Subscribers, on the 10th March, 1842. It is placed in the Society's Library.



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